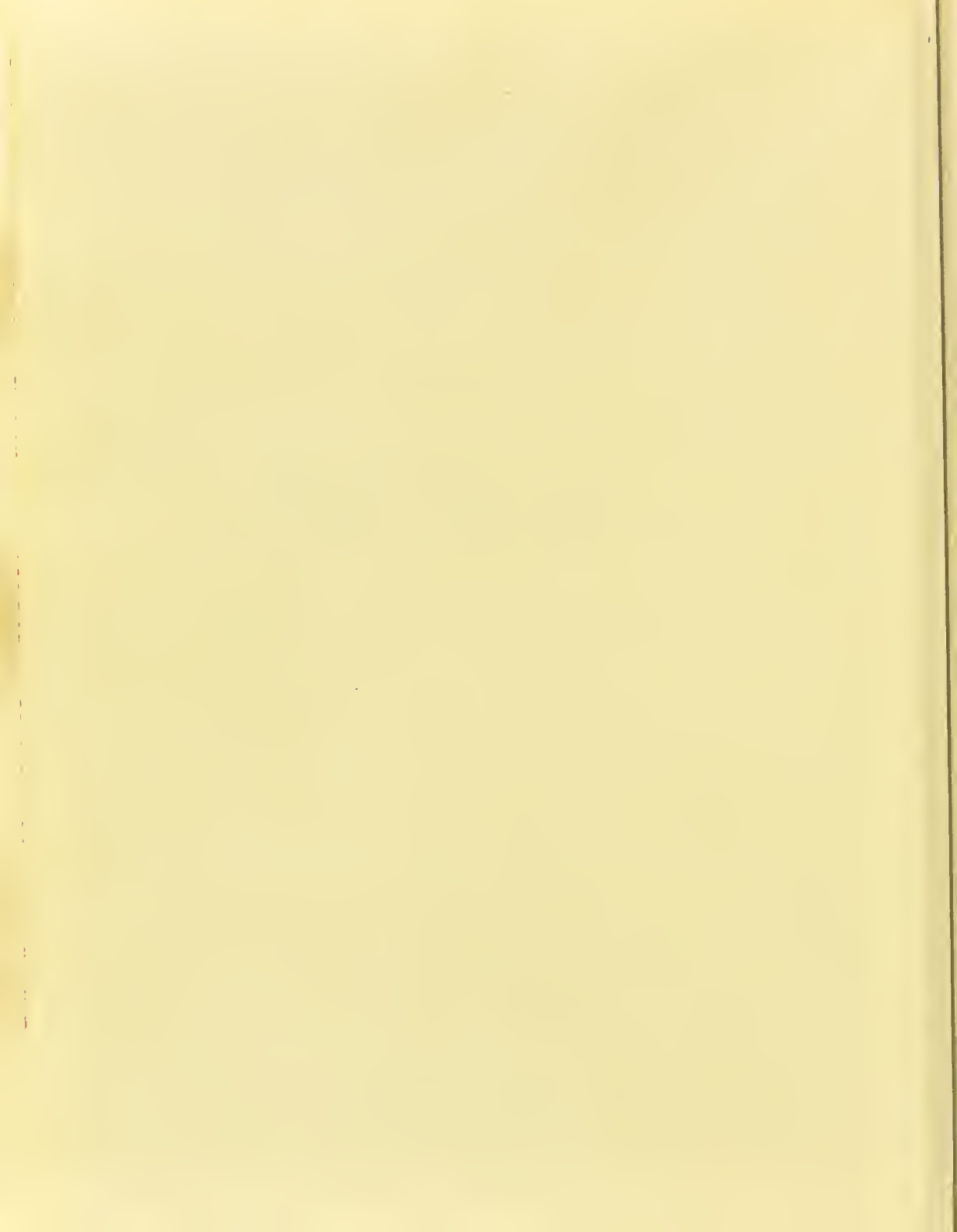




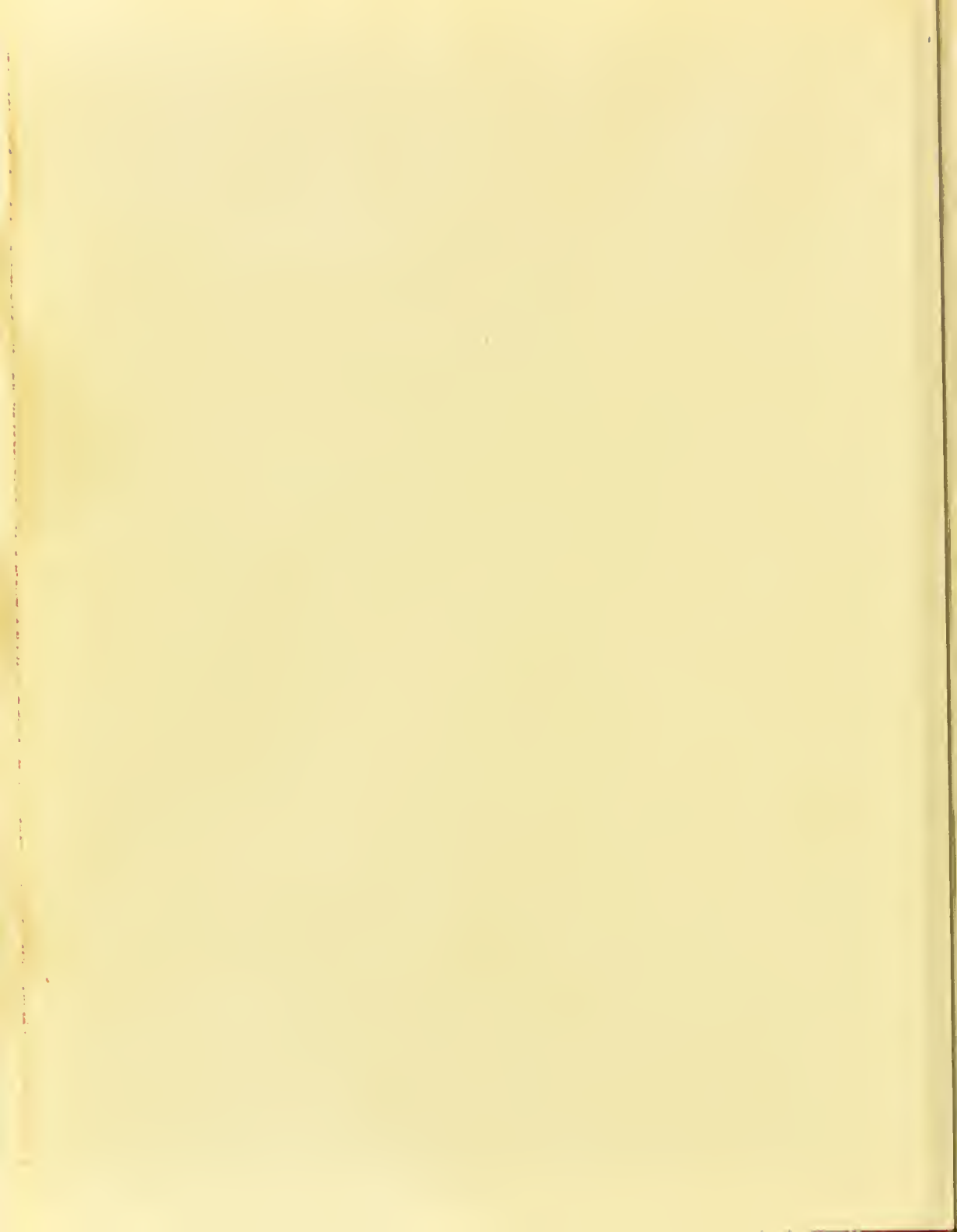
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STERILITY IN THE WOMAN

AND ITS TREATMENT.

BY

DR. DE SINETY.

TRANSLATED BY E. P. HURD, M.D.



1893.

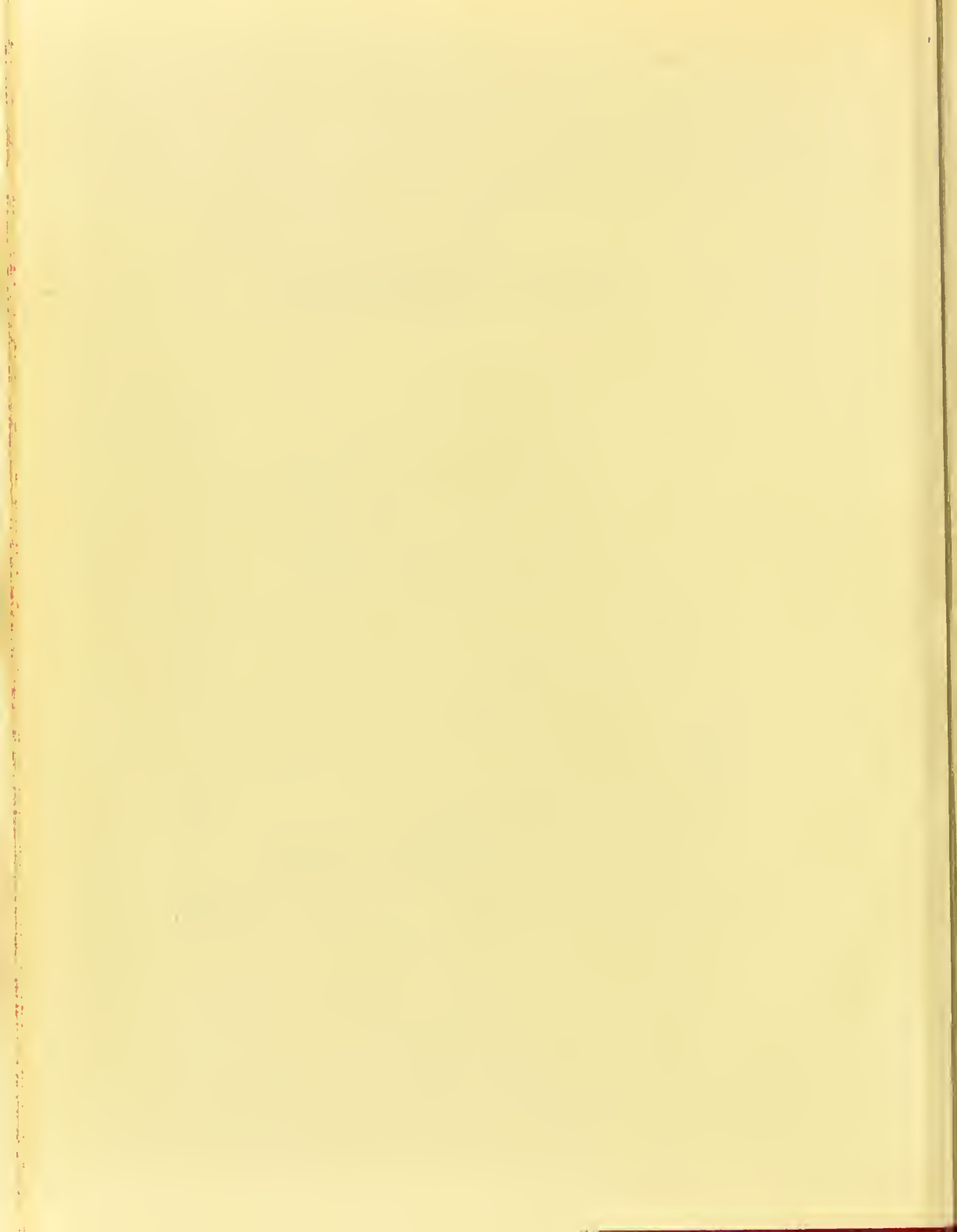
GEORGE S. DAVIS,
DETROIT, MICH.



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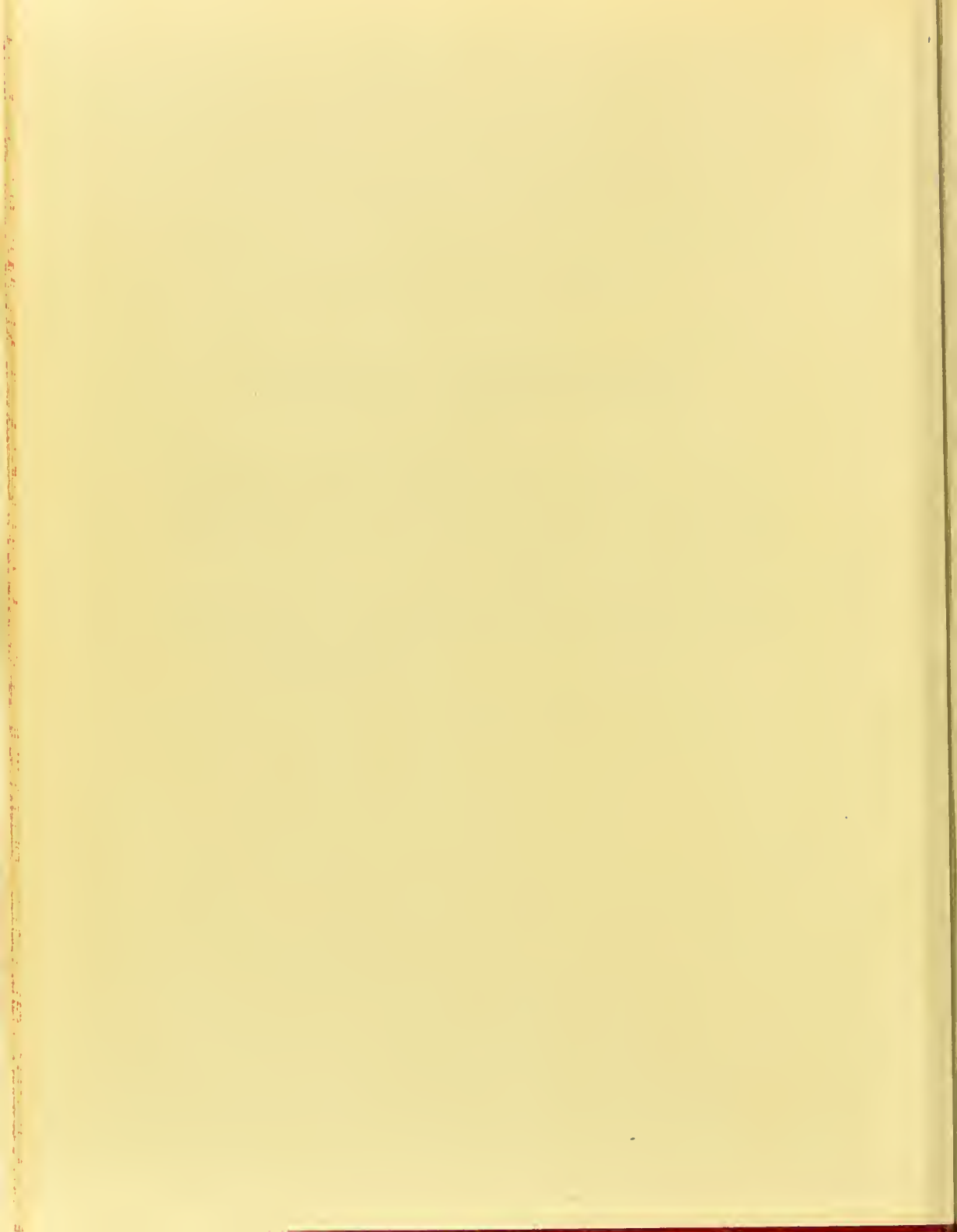
TRANSLATOR'S PREFACE.

The author of this work is a well known Continental authority on obstetrics and the diseases of women. He is the author of a popular text-book on Gynæcology which has run through many editions.

I have taken the liberty somewhat to abridge the treatise. Such omissions as I have made pertain chiefly to the chapters on Abortion and Extra-Uterine Pregnancy.

E. P. HURD, M. D.

Newburyport, Mass., May 16, 1893.



STERILITY IN THE WOMAN, AND ITS TREATMENT.

I.

FECUNDATION.

According to the most recent researches, the spermatozoid is accompanied at its entrance into the ovum by a little protoplasmic mass which unites with a similar element belonging to the female nucleus. The essential act of fecundation consists, then, not only in the union of a male with a female nucleus, but also in the union of two protoplasmic masses accompanying these nuclei.

After fecundation the ovule becomes again a true cell, possessing only one nucleus, resulting from the fusion of two nuclei—the one derived from the male, the other from the female. This cell undergoes segmentation, in its turn, into a great number of little cells destined to form the blastoderm, the first form of the embryo. We may then say with Balbiani that the first nucleus of segmentation is a mixture of the substance of both father and mother, and that each cell of the new individual contains molecules from both sources. Thus is explained the

transmission of the qualities of the parents to the offspring.

We have just seen that fecundation results from the union and fusion of two elements, the ovule and the spermatozoid. It is necessary, then, in order that the reproduction of the individual may be accomplished: first, that there shall be a normal functioning of the glands that produce these elements, namely, the testicle and ovary; in the second place, that the ovule and spermatozoid shall be expelled and shall meet in determinate conditions, both having preserved their own properties and their activity; lastly, that the fecundated ovum shall find a favorable soil for its nutrition and its development.

The part of the female in the function of reproduction is much more complex than that of the male. Like the latter, she furnishes a special element: the ovule, which possesses all her physiological properties. But, besides, it is in the interior of her organs that the meeting takes place of the two factors destined to form the new being, and it is on a part of the same organs that the embryo is grafted and draws its nutritive supplies.

It hence results that in the marriage relation the wife must naturally, oftener than the husband, be the cause of the absence of offspring. At the same time, this notion, quite theoretical, has been much exaggerated. We are to-day very far from the view of the old writers who taught that nine times out of ten

the absence of offspring is imputable to the woman. The husband is much more frequently than was taught a few years ago the one at fault.

In some recent statistics published by Lier and Ascher* we find that out of 424 sterile marriages, in 169 cases, *i. e.*, 40 per cent., the fault was with the husband.

We shall study now in the case of the woman the obstacles which may oppose reproduction in each one of its phases. According as these obstacles are more or less pronounced, more or less easy or impossible of removal, we shall have a sterility which is absolute or relative, curable or incurable.

The first condition for fecundation is that the fecundating liquid shall penetrate the genital organs of the female. This penetration ordinarily takes place through sexual intercourse; but sexual intercourse is not altogether necessary, as we shall see further on when we come to speak of artificial fecundation.

* Lier and Ascher, Zeitschrift f. Geb., Bd. 18, 1890.

II.

CAUSES OF STERILITY ORIGINATING IN THE VULVA AND VAGINA.

Imperforations of the vulva, or inferior part of the vagina, render the woman sterile and impotent at the same time. Nevertheless these imperforations sometimes pass almost unperceived, and do not oppose coitus, for the occluding membrane gives way and a blind pouch is formed under the repeated attempts at connection; sometimes, even, the sexual act takes place in the urethra, which undergoes gradual dilatation by the efforts of the male organ. I have observed several cases of this kind in which the urethra was large enough to give passage to the penis, without any resulting incontinence of urine; but if in these conditions coitus becomes possible, sterility is none the less certain.

There has been much confusion in the use of the terms *impotence* and *sterility*. Although the former is frequently the cause of the latter, there exist notable differences between these two words. Impotence is the impossibility of accomplishing the sexual act; sterility, the impossibility of having or begetting children. The one has to do with a voluntary act of the animal life; the other, unconscious and involuntary, is a part of the functions of the organic or vegetative life.

Some examples, taken from both sexes, will make this difference plain.

A man presents an abnormality of the penis, a hypospadias or abnormal opening of the canal of the urethra. The resulting deviation of the spermatic jet is often in such cases an obstacle to fecundation, and yet the subject has all his virile powers perfectly intact.

Again: As a sequel of certain inflammations of the epididymis, the sperm loses its reproductive qualities, although the venereal act may be complete and even followed by ejaculation. All is apparently so normal that the man in good faith affirms that he is not responsible for the infecundity that has followed his marriage, although in reality the fault is entirely his. Cases of this kind are more frequent than is generally supposed.

Even the operation of castration, when performed on the adult subject, cannot be relied upon to peremptorily suppress all the appearances of sexual vigor. The desires and the turgescence of the copulative organ may persist for many years, and yet the sterility is absolute and irremediable.

In the facts which we have just stated, there is sterility and not impotence.

We find in the female, examples quite as much to the purpose. The ablation of both ovaries renders the subjects absolutely sterile, while the aptitude for coitus is not modified. Venereal desires and volup-

tuous sensations remain as before the operation. The menopause offers a situation which is very similar. The woman, though no longer able to conceive, is no less apt for coitus; is sometimes even more ardent in her desires than in her youth.

In the woman there may also be impotence without sterility, as is proved by the fact of pregnancy without intromission, with a hymen presenting only a pin-head orifice.

In old medico-legal literature dating from an epoch when suits for divorce for alleged frigidity were common, we find numerous examples of this kind. An instance is recorded where a wife accused her husband of impotence, and was found pregnant, though presenting malformations of the vulva and vagina which prevented coitus.

The absence of the vulva coincides sometimes with integrity of the internal genital organs. In these cases there exists in the region which should be occupied by the vulva a little perforation representing the orifice of the uro-genital sinus. The vulva may, in certain circumstances, preserve in the adult the infantile character.

The absence of the vagina is difficult to distinguish from a rudimentary development. The anatomical diagnosis has, however, no importance from a practical point of view.

The closure of the vagina is due either to the imperforation of the hymen, or to a membrane in the form

of diaphragm situated more or less high up, generally at the union of the lower two-thirds with the upper third—that is to say, four or five centimeters from the vulvar orifice. In the first case, there is impotence and consecutive sterility. In the second, coitus may take place, and if the septum is complete, it is chiefly by the accidents of retention of the menstrual flux that attention is directed to the fact that something is wrong. At the moment of puberty, the woman experiences all the physiological manifestations of menstruation, except the issue of blood by the vulvar orifice. Pains more or less severe return at the regular epoch, forcing the patient to take her bed for several days.

Local examination furnishes more precise information. In the case of rudimentary vagina, it will be seen on separating the labia majora that the orifice is obliterated by a dense tissue which does not yield on pressure of the finger. No opening, except the urethral, to any internal organ, is found; or there may be a little indenture terminating in a blind cul-de-sac a short distance from the vulva. In these cases of rudimentary vagina or atresia vaginæ, the general symptoms are *nil* or but little marked, the uterus being also rudimentary.

In the cases of closure by a membranous septum, the examining physician notices the presence of a tense violaceous tumor projecting at the vulva, mounting upward into the pelvis and sometimes even

above the umbilicus. This tumor increases in size at each menstrual epoch, at the time when the pains are felt.

These mechanical obstacles to the penetration and transit of the sperm, necessitate a surgical operation. In the cases of which we have just spoken, *i. e.*, when the obstacle is seated at the vulvar orifice or in some part of the vagina, the physician will have recourse to dilatation or the bistoury.

When the obstacle consists only in a rather tough membrane, a longitudinal or crucial incision suffices in most cases. But if the interposed tissues are thick and it is necessary to open up and establish a passage to constitute the vagina, the operation becomes much more difficult and painful.

The absence of general menstrual phenomena at the age of puberty is a contra-indication for all surgical interference, at least from the point of view of sterility. In such circumstances, the woman often demands the aid of the surgeon to enable her to have sexual relations, even though these cannot be followed by fecundation.

I shall briefly describe the operation necessary to create an artificial vagina when there is retention of menstrual flux.

The bladder and the rectum being previously emptied, the patient is anæsthetized and placed in the lithotomy position. By means of the forefinger of the left hand introduced into the rectum, and a catheter

in the urethra, which is held there by an assistant, the surgeon will direct the various manœuvres of the operation.

In a first stage the operator will make a transverse incision, with two little lateral flaps, at equal distance from the rectum and the urethra. He will dissect upward with the fingers and spatula rather than with a bistoury, separating the tissues and the fascia, taking care to keep always as near as possible to the wall of the rectum, the wounding of which, as well as of the bladder, constitutes the greatest danger of the operation. In a second stage, when he shall have arrived at the tumor, he will freely incise it. After having rid the pouch of the blood and clots which it contained, he will wash it out with an antiseptic solution, and apply a dressing of iodoform gauze.

In order to oppose the cicatricial contraction consecutive to the operation, it is very important to cover with teguments the infundibulum which has been created. The surgeon will utilize for this purpose the flaps of skin and mucous membrane which he has separated from the neighboring parts during the operation, and which have been dissected with care and left for that purpose. But, despite all the powers of autoplasmic surgery, the cicatricial tissue has a great tendency to fill little by little the cavity thus artificially obtained. Hence it is necessary to continue the dilatation a long time. Coitus practiced every day may prevent the retraction of the tissues from taking place.

In a case cited by M. Lefort, this surgeon, by means of electrolysis continued for a certain time, had succeeded in making a canal of three to four inches in depth, but we do not know whether the final result was successful.

When there exist incomplete septa, a surgical operation will be indicated if there is an obstacle to sexual relations.

Sometimes the absence of procreation results from reflux of the spermatic liquid immediately after coitus, whether this be due to insufficient depth of the vagina in absence of any membranous closure, or to the fact that the vagina, though of normal dimensions, does not retain the semen. In these latter cases we almost always find the uterus in a *retro* position.

At other times the opposite condition obtains, *i. e.*, there may be an exaggerated depth of the posterior vaginal cul-de-sac.

In a case of the first kind, the husband may be advised to leave the copulatory organ a certain time in the vagina after coitus. In one of the second kind, the proper precaution would be to introduce before connection a large tampon of antiseptic cotton to fill the posterior vaginal cul-de-sac, care being taken that the tampon shall not cover the os uteri.

Certain women, in the absence of all malformation, present a special pathological condition designated under the name of *vaginismus*.

Vaginismus manifests itself generally by two principal phenomena: hyperæsthesia of some part of the external genital organs, with contracture of the muscles of this same region. These two symptoms, though generally associated, sometimes exist separately, or one of the two may persist after disappearance of the other.

The different varieties of morbid manifestations which have been designated under the name vaginismus, have all the same consequence—that of preventing copulation. In women who present this pathological condition the least touch of the vulvar orifice produces pains which are often intolerable. Rarely spontaneous, these hyperæsthetic manifestations are produced whenever the attempt is made to introduce into the genital passages any foreign body whatever, though of small size. All the vulvo-vaginal region may be endowed with this excessive sensibility, or there may be one hyperæsthetic point only: the hymen, the carunculæ myrtiformes, the clitoris. In several cases of this kind I have also noticed by the touch painful points on the neck of the uterus.

The painful tetanic contraction is not always seated at the same place. I have observed it at the lower orifice of the vagina, or at a certain distance (four or five centimeters) from this orifice. We have here the two forms which have been described under the name of inferior and superior vaginismus. The first possesses most interest as a cause of infecund-

ity. We must, however, consider it only as a danger of relative sterility, for, despite incomplete copulation, fecundation is possible. Cases of pregnancy have been observed in these conditions, just as in persistence of the hymen. Sometimes, also, intromission takes place, despite the spasm and pain, and conception occurs. But the vaginismus may last during pregnancy, and even persist after confinement. I have observed instances of the kind. Beside the hindrance which it causes to fecundation, this morbid condition has also been accused of producing abortion. I have, however, seen women thus affected go without hindrance to the full term of gestation.

The morbid accidents which I have mentioned are generally dependent on an ulceration or a fissure, sometimes difficult to detect. These are often observed in newly married wives after repeated unsuccessful attempts at coitus on the part of the husband, whose vigor is insufficient. These facts are the more important to know, for the reason that in most cases when the tegumentary lesion is cured all morbid manifestation ceases, and fecundation takes place naturally.

So also a pediculated polypus at the urethral orifice, an erosion seated on a lacerated perineum, affections of the bladder or anus, vaginitis or vulvo-vaginitis, sometimes give rise to painful spasm of the vagina.

Certain women by their special conformation are more exposed than others to inflammations of traumatic origin consecutive to coitus.

In these subjects the vulva is sometimes so situated that the male organ hits against the fourchette or the fossa navicularis, or, inversely, against the urethra or vestibule, whence result traumatisms which may give rise to vulvitis and to painful contractions. It often suffices in such cases to let the patient rest a few days, and to vary the position in copulation, in order to effect disappearance of the vaginismus. Young wives are not alone exposed to these troubles of sensibility, and I have seen cases that have resisted confinement.

Vaginismus may often be cured by medical treatment alone. If you find a local lesion, you will first of all seek to obtain cicatrization by baths, by warm lotions with boric acid water. If the fissure or ulceration will not heal, you will have recourse to cauterizations with nitrate of silver or tincture of iodine, but you must remember that these cauterizations are quite painful. Iodoform in powder, or still better, iodoform dissolved in ether to saturation, has given me good results in cases of vaginismus associated with hyperæsthesia of the clitoris.

If there is only a little redness of the hyperæsthetic parts, they should be painted three times a day with a solution of cocaine (5 per cent.). Hot vaginal douches should also be employed with bromide of potassium (150 grains to the quart), also vaginal suppositories containing opium and bromide of potassium:

Cacao butter.....	4 grammes.
Bromide of potassium.....	50 centigrammes.
Ext. opii.....	10 centigrammes.
Thymic acid.....	5 centigrammes.

M. For one suppository.

When the vaginismus coincides with painful points over the seventh and eighth dorsal vertebræ, it is well to make revulsion over this region; the best means being punctiform cauterizations. If, despite these divers measures, the painful contraction of the vagina persists after several weeks of treatment, you should resort to dilatation. This can be practiced during the chloroform sleep by means of a speculum, the valves of which you will open after you have introduced it, and you will withdraw it wide open, the valves being fixed in this position by means of the screw. Lastly, it is in cases of this kind that I have succeeded in obtaining fecundation by making the husband have connection while the wife was under the influence of anæsthesia by chloroform.

III.

STERILITY DUE TO CAUSES EXISTING IN THE UTERUS.

We come now to the conditions on the part of the uterus which oppose fecundation.

The arrests of development of this organ, according to their degree, are an absolute or relative cause of sterility.

Absence of the uterus—*i. e.*, instances in which there exists no trace of the organ—is extremely rare; some authors deny that any such cases have ever existed. Less exceptional are the instances of arrest of development, designated as foetal, infantile, or pubescent uterus.

We call *foetal uterus* the condition in which the adult woman preserves the characters which the uterus presents in the new-born infant. Instead of taking on its conoid form, the uterus remains cylindrical. The cervix constitutes almost the entire organ, the cavity of the body being scarcely at all developed. The walls of the body are thinner than those of the neck, and the total length of the organ may not be more than four centimeters. The ostium makes a slight projection into the vagina with its pin-hole orifice. The ovaries may be rudimentary, or normal and functionate actively. The vagina is ordinarily short and narrow.

The *infantile uterus* presents some slight anatomical differences from the foetal uterus, but these differences, however interesting from the point of view of pure science, have no importance from the standpoint of treatment. Clinically, the foetal cannot be distinguished from the infantile form.

Women in whom these arrests of development are met, often present external appearances which are normal. Others have the pelvis and the mammæ but little developed. What especially attracts the attention of patient and physician is the absence of menstruation. The menstrual molimen may exist, with its periodical train of lumbar pains, of migraine, and even of leucorrhœa.

Besides the functional signs, palpation, the touch, and especially the touch combined with catheterization, will give the needed information respecting the small dimensions of the uterine organ.

In one observation which I published several years ago, the foetal uterus was complicated with metritis and perimetritis to such a degree that the thickness of the walls might have led to the erroneous belief that the organ was normal, if catheterization had not shown that the uterine cavity was only four centimeters in depth.

Sterility being the necessary consequence of these arrests of development, there is, of course, no treatment that can be called curative.

Under the name *pubescent uterus* is designated the

abnormality of the organ persisting in the adult with the characters which belong to the epoch preceding puberty. We do not here observe the predominance of the body over the cervix, as the two segments divide the uterus into almost equal parts. The cavity measures at least a centimeter less than that of the virgin organ after the first menstruation.

In women with pubescent uterus, the state of the vagina, of the ovaries, and of the mammæ is very variable. There is always some trouble with the genital functions. Menstruation is completely lacking, or it is feeble, insufficient, and irregular. By the expert touch the vagina is generally found to be diminished in length and in size. At other times it preserves its normal dimensions. Sometimes scarcely the size of a pea, sometimes represented by a little thin and pointed cone, the *os tincae* makes an almost inappreciable projection into the vagina. The external orifice is often contracted so as not to admit the uterine sound. It may then be possible only by means of a probe to determine the slight dimensions of the uterine cavity.

In cases of this kind it is ordinarily the absence of menstruation at a time of life when this is expected that principally attracts attention.

It is important to ascertain, whenever a case of amenorrhœa presents itself, if this is due to an anatomical or to a physiological cause—*i. e.*, to a vice of conformation, or to a general state of the organism.

If the woman is not more than 16 or 17 years old, it may be well to wait and watch the progress of the case. If her age has exceeded 20 years, it is extremely probable that the amenorrhœa is due to an anatomical fault, which can only be ascertained by a thorough examination. The cause of all these arrests of development is unknown. They occur in healthy and robust, as well as in debilitated and anæmic women.

Gynæcologists are not in accord as to the prognosis of sterility due to the pubescent uterus. Some regard this state as incurable and leading surely to sterility; others admit the possibility of cure and of ultimate fecundation. I myself take this view, and am far from counseling a *laissez faire* policy.

The constitution of the patient must first be fortified by a good hygienic regimen, exercise, gymnastics, and nourishing food. The use of iron and calisaya will find its place, especially in cases accompanied by chlorosis and anæmia; but iron is often of little benefit to chlorotic patients, unless their habits of life are changed. Hence it is well to recommend for these patients seaside residence, or even sea-baths if there are no concomitant hysterical manifestations; perhaps better than these may be a sojourn at some mountain station where hydrotherapy can be employed in conjunction with vigorous outdoor exercise. I have often replaced with advantage the ferruginous preparations by preparations of hæmoglobin.

It is well to bear in mind, in connection with the employment of cinchona bark, that patients should be cautioned against the unseasonable use of cinchona wine taken on an empty stomach before meals. I believe that we make too free a use of this preparation in this country, prescribing it for almost every complaint, and that the wine is, especially for women, a bad mode of prescribing cinchona. First, the quantity of active substance contained in a small glass of the wine is very trifling. Then there enters into the fabrication of this medicine a considerable quantity of alcohol, and the dyspepsia which is so frequent in chloro-anæmic women is generally aggravated by its action. It will only be indicated if the physician thinks there is utility in giving with the cinchona a small dose of alcohol. But even in such cases he ought to instruct the patient to take it after meals and *never* before. The powder or extract of cinchona may often advantageously be given instead. A favorite formula of my own is the following:

R Soft extract of cinchona..... 4 grammes.
Powder of cinchona..... q. s.

M. F. S. A. pil. No. xx. Sig.: Two pills at meal-time.

In these cases of arrest of development, when the woman has attained the age of 20 years or thereabouts, one may hope to act favorably upon the uterus by means of electricity.

The electrical current should be applied directly to the uterine mucous membrane. The introduction of a small electrode, which may be left in place several hours, the patient remaining in bed, will meet this indication. In these divers manœuvres we cannot too much urge the adoption of rigorous antiseptic precautions; of this we shall speak more in detail under the head of Dilatation of the Cervix.

We can only touch upon other abnormalities of the uterus, due also to arrests of development, such as the uterus unicornis and the different varieties of double uterus. In cases of uterus unicornis completely developed, pregnancy often goes on without hindrance, and instances are on record where women with this abnormality have been confined ten or twelve times. When the organ is unequally double, if the product of conception is lodged in the principal horn, delivery generally takes place without any trouble; if it is the rudimentary horn which contains the foetus, there will be reason to fear a rupture from the third to the sixth month. These cases, which bear a marked resemblance to tubal pregnancy, generally end fatally.

Women who are the subjects of double uterus are very apt to conceive. Cases have been reported of women undergoing fourteen to seventeen pregnancies, despite this malformation. Ordinarily gestation goes to its full turn. Other women abort a certain number of times without being able to go on to the

ninth month. But it will be seen from what has been said that neither the one-horned uterus nor any of the different varieties of double uteri are a cause of sterility; and if women presenting any of these anomalies are a little more exposed to puerperal accidents than others, these dangers are neither sufficiently constant nor sufficiently notable to constitute an impediment to marriage.

Obliterations and constrictions of the neck of the uterus—frequent causes of sterility—are congenital or acquired.

The congenital obliteration of the cervix is much rarer than that which is produced after birth. The latter is generally met at the external orifice, and results either from the formation of cicatricial fibrous tissue, or from adhesions established between the mucous membrane of the vagina and that of the uterine neck. Cauterizations carelessly and unskillfully or excessively applied, and the cervical lesions consecutive to accouchement, are the most ordinary causes of this category of accidents. Writers have also mentioned gangrene, ulcerations, blennorrhagia, and syphilis. But it is probable that the cases cited as of blennorrhagic or syphilitic origin were rather due to cauterizations.

The etiology of acquired cervical stenosis is, in general, the same as that of cervical obliteration.

The diminution of calibre may be seated on divers points of the cervical cavity. In the congenital

form, it ordinarily affects the entire length. The os tincæ is pointed, conical, indurated. The external orifice is small, often scarcely recognizable to speculum-examination by a drop of mucus escaping from it. Sometimes this orifice is concealed by the anterior lip, which may be more prominent than the posterior.

The stenosis is observed at one or both orifices. That of the external orifice is much the more frequent. According to Sims, in 85 per cent. of cases of natural sterility, there is a conical neck with narrowness of the orifice.

The stenosis of the neck coincides sometimes with an arrest of development of the uterus, or even of the whole utero-ovarian apparatus. It is very important, from the point of view of prognosis and treatment, not to confound these cases with simple stenosis coexisting with a genital system of otherwise perfect conformation. The dimensions of the body of the uterus, and the character of the dysmenorrhœa which accompanies most cases of this kind, will enable one ordinarily to distinguish the cases which are amenable to treatment.

Besides the anatomical stenosis, one will now and then observe in certain women spasmodic constrictions taking place at the level of the isthmus, similar to such as occasionally give trouble at the neck of the bladder.

It is by practicing uterine catheterism that we notice the existence of this functional trouble, which

plays, I believe, a certain rôle in the etiology of sterility. This is rarely absolute as a consequence of the cervical stenosis, anatomical or spasmodic, which only diminishes the chances of fecundation by interposing an impediment which is the greater, the smaller the diameter of the orifices.

The cervical contractions are ordinarily accompanied by menstrual disorders, and principally by dysmenorrhœa.

In order well to comprehend the mode of action of this narrowing of the uterine neck, we must well understand the mechanism of the penetration of the spermatozoids. Their own proper movements constitute, without doubt, the principal agent of their progression, which varies according to cases and according to media, averaging from 1 to 3 millimeters a minute.

But these intrinsic movements are not, perhaps, the only cause of their penetration into the uterus. It was formerly an admitted tenet that the seminal ejaculation must take place directly into the mouth and neck of the uterus. The condition for this does not exist when the uterus is normally situated. The cervical orifice is pointed backwards, and the jet of semen is directed principally upon the anterior and external wall of the os tincæ.

It is not possible, moreover, as has been alleged, that the glans penis can act after the fashion of a wedge during coitus so that the fecundating liquid is

thrown between the lips of the os. Sims thinks that the constrictor muscle of the vagina, in contracting under the influence of the venereal act, applies the extremity of the penis to the cervix. But how many women become pregnant who have never any contraction of the muscles of the vagina!

It has been supposed that the alkaline mucus of the cervix was projected out of the cervical cavity, under the influence of a sort of erection during coitus, and was then drawn back by the retraction of the tissues, after being mixed with the spermatozoids. This would be a process of the same kind as that of the aspiration of the fecundating liquid by the os tincæ—a theory which some writers have broached.

On the other hand, it is easy to understand that a very thick and semi-solid plug of mucus, such as has often been seen, might be an obstacle to the penetration of sperm through a narrow cervix. Haussmann, in his researches on the vitality of the spermatic elements, has almost always met spermatozoids in the cervical mucus several hours after coitus, when the orifice was normal, and never when the dimensions did not exceed 2 centimeters.

These observations agree, then, in demonstrating the important rôle of stenosis of the neck in the pathogeny of sterility.

At the same time, the spontaneous movements of the zoösperms suffice for their penetration into the genital passages, as is proved by cases of preg-

nancy supervening despite the persistence of the hymen.

The treatment of these various anomalies of the uterine neck varies with the kind of malformation.

If there exists a complete obliteration of the cervix, it will be necessary to have recourse to a cutting operation, great care being taken that the subsequent cicatrization shall not close the canal; this latter accident can generally be prevented by keeping up dilatation by the use of tents.

What dominates the situation in most of the complete obliterations of the vulvo-uterine canal, is the retention of the menstrual flux. It is also this order of accidents which furnishes the precise indications as to the mode of intervention and the time for intervention.

The stenoses of the cervix uteri, which are by far more frequent than the obliterations, have played an important part the last few years relative to the theory and treatment of sterility.

Some writers have considered this importance as exaggerated, and they are fond of making the remark that where a blood globule can pass (*i. e.*, the menstrual fluid), a spermatozoid can pass. This comparison is hardly exact, for the spermatozoid penetrates chiefly by its own movements—that is to say, with little force—while the menstrual blood is expelled by the uterine contractions, which are sometimes very strong in these conditions.

It is, moreover, certain that the disappearance of the stenosis is very frequently followed by conception.

In certain cases, as before intimated, the stenosis of the neck is accompanied by an arrest of development of the uterus and ovaries. In these conditions there is little or no menstrual flow, and no periodical pains at the moment of menstruation. In other women the stenosis coexists with integrity of all the rest of the utero-ovarian apparatus. This category of patients presents an array of symptoms which are almost typical. You will find on inquiry that before their marriage the menstrual epochs were accompanied with severe attacks of pain. These attacks became more and more intolerable, and sexual intercourse only tended to aggravate their intensity. On examination, the uterus is found to be of normal dimensions, oftener hypertrophied, with atresia of the cervical canal or of the external orifice alone.

The best mode of treatment of stenosis of the uterine neck consists in dilatation.

A good many gynæcologists, following the example of Sims, have counseled incision of the cervix or ablation of a part of the inferior extremity of the os tincae.

These operations, perhaps useful if there be along with the stenosis a hypertrophic elongation or partial hypertrophy—lesions of which I shall presently speak—do not seem to be indicated in cases where there is simple atresia.

When the stenosis is accompanied by incomplete development of the uterus and ovaries, the dilatation will be quite useless. It is preferable in these circumstances to institute the treatment which I have indicated under the head of Pubescent Uterus: catheterism of the uterine cavity repeated every two or three days with a very fine bougie, and local applications of electricity.

The dilatation generally acts favorably in stenoses of the cervical canal coincident with integrity of all the rest of the utero-ovarian apparatus, and accompanied by painful crises at the menstrual period. In these cases, sometimes a single dilatation is sufficient to obtain disappearance of the dysmenorrhœic accidents, and conception may speedily ensue.

The dilatation of the cervical canal is generally effected by tents of laminaria rendered aseptic by iodoform. The vagina should first be disinfected by means of sublimate injections ($\frac{1}{2000}$), and tampons of iodoform gauze left a few hours in the vagina. If you desire to obtain complete dilatation of the uterine cavity, you will begin by sea-tangle tents and finish by sponge-tents, made thoroughly antiseptic.

In cases of sterility where we wish to obtain only a diameter of a few centimeters, complete dilatation is needless, and the laminaria answers the purpose. The patient should be kept in bed during the whole time that the dilatation is going on. Sometimes the sojourn of a foreign body in the cervix produces

severe colicky pains, which may necessitate a hypodermatic injection of morphine and the application of ice to the abdomen. In the case of spasmodic contractions of the cervical orifice, gradual dilatation by means of bougies of graduated sizes is an effectual method of treatment. The bougies must be made thoroughly aseptic.

Every second day you will introduce into the cervical cavity a gum bougie, passing in the largest size that can well be made to enter. On the next occasion, one of still larger size will be introduced, and so on, till you have obtained the dilatation you desire. This bougie, which is first soaked in a sublimate solution, is pushed along gently and with care through the canal; it will not do to overcome any obstacle by force. When the bougie has passed the internal os, it may be kept in place from five to ten minutes to get a full dilating effect.

This little operation does not necessitate on the part of the patient sojourn in bed, and may be performed in the physician's office. It is very seldom that patients are taken with syncope or experience any other uncomfortable sensations from simple uterine catheterization; and the progressive dilatation by means of bougies of various sizes, when done carefully and gently, is almost always well supported, and produces neither pain nor any other ill consequence.

Besides the mechanical impediments to the penetration of spermatozoids, there are others of chemical

order. These consist in certain alterations of the vaginal or uterine secretions, which may diminish or destroy the vitality of the zoöperms. Too acid a secretion is deleterious to these elements. In the normal state the vaginal mucus is acid, and the uterine mucus alkaline. The sperm is soon altered by its sojourn in the vagina. It appears, from some researches made on this subject, that the spermatozoids in contact with the vaginal mucosa lose their activity almost immediately, or, at the farthest, after twelve hours; while in the cervical mucus a certain number will retain their mobility for seven or eight days.

Under the influence of menstruation the noxious action of the vaginal liquid is considerably weakened, and this augments the chances of fecundation at the physiological moment.

The deleterious action, on the one hand, of the vaginal acid secretions on the vitality of the spermatozoids, and the favorable influence, on the other, of alkaline liquids on the spontaneous movements of these elements, give rise to certain special therapeutic applications. Thus, for the woman who wishes to favor fecundation, it is a good practice to take an alkaline douche the evening before coitus, the pelvis being slightly raised so that the genital organs may be bathed for some time in the medicated solution.

For these irrigations you may employ Vichy water or a weak solution of either bicarbonate of soda or potash. These alkaline liquids long keep up the

movements of the spermatozoids, even reviving them when they have ceased.

Soda baths have also been advised ($\frac{1}{2}$ lb. to the water of a full bath). To obtain any benefit from them, the patient should introduce a speculum while in the bath, so that the water may penetrate the vagina.

The hygienic benefit of a sojourn at certain thermal stations has been often urged. I shall return to this question of mineral waters when I come to speak of the treatment of sterility dependent on the diatheses or general diseases.

Other anomalies of the uterine neck have also a relative importance in reference to sterility. Of this number are the hypertrophic elongations.

The augmentation of volume affects divers points of the cervix. Sometimes it is the infra-vaginal portion, *i. e.*, the part situated below the vaginal insertion. Sometimes it is the supra-vaginal portion which is affected. Some writers have also described a hypertrophy of the medium segment.

These hypertrophic elongations, to whatever variety they may belong, are a hindrance to fecundation, and in very marked cases may be at once a cause of impotence and of sterility by preventing sexual relations.

It will not do to confound these partial hypertrophies of the cervical region with prolapsus uteri. The presence of the elongated neck at the vulvar ori-

fice despite the normal situation of the fundus uteri, will of itself differentiate the condition from prolapsus.

The prognosis, from the point of view of sterility, varies according to the degree of the hypertrophy. The latter is not, however, an absolute obstacle to fecundation, for I have seen women become pregnant notwithstanding a very marked hypertrophy of the kind mentioned; such cases are, however, the exception. In a great number of women who have never had children, despite an earnest desire for offspring, I have noted one of the forms of hypertrophic elongation of the cervix uteri.

Sometimes one of the lips of the os tinæ is hypertrophied alone. It then trenches on the other lip, covers it, and the cervical orifice is found to be occluded from below upwards. If both lips are hypertrophied together, it is likely to be at the expense of the calibre of the cervical canal, which becomes more and more narrow and sinuous. When there is ectropion (eversion of the intra-cervical mucosa with thickening), the orifice seems patulous and larger than in the normal state. But often, at a little distance above, the neck is occluded, or nearly so, by the juxtaposition or swelling of the mucosa, and the uterine sound is introduced with difficulty.

The treatment consists in ablation of the hypertrophied part. In cases of elongation of the intra-vaginal portion, the distance of the parts on which the

surgeon operates from the peritoneum and bladder renders excision easier.

Surgeons have employed different instrumental means for the amputation of the cervix: scissors, the thermo-cautery, the *écraseur*, and the galvano-caustic loop. At the present day most of these methods are abandoned, being replaced by amputation by means of the bistoury.

Every section by the *écraseur* or by an incandescent instrument gives rise to a nodular cicatrix ending in stenosis. The circular amputations with the bistoury have the same inconvenience, though in a less degree. Hence we cannot too strongly urge the practitioner to perform amputation with two flaps for each lip—an operation which, by the bringing together and union of the divided mucosæ, prevents consecutive contraction of the uterine orifice.

The patient is first etherized and placed in the lithotomy posture; the fourchette is forcibly depressed by the Sims speculum, and the uterus is brought well down to the os externum. The surgeon divides the commissures of the neck, as far as the cul-de-sac, with scissors or a large bistoury. He then incises the internal mucosa of the anterior lip from below upward and obliquely, then the external mucosa in the same way, so that the two incisions shall meet above at an angle, and a conical segment (the base below and the apex above) shall be included within the incisions. The two flaps thus obtained are united by means of

five or six points of catgut suture. The posterior lip is treated in the same way. The two commissures are then united by one or two catgut sutures.

During the entire operation, irrigation should be kept up. The operation terminated, a tampon of iodoform gauze is introduced into the vagina, and left there for three days. After removing the tampon, the medical attendant will order a vaginal douche of sublimate water ($\frac{1}{2000}$) morning and evening, and the parts will be healed at the end of a fortnight. The patient should keep the bed during the whole of this period.

In cases of hypertrophy of the supra-vaginal portion, Huguier proposed an operative procedure which has been long in use. But to-day, whatever be the method employed, the surgeon will always aim to exactly approximate the mucous membrane, after the excision of a wedge-shaped piece from each lip.

It is not necessary to remove a great quantity of tissue, as the amputation of a small part of the cervix brings about a considerable diminution of volume of the rest of the organ.

In cases of hypertrophy of one or both lips of the os tinæ, it is necessary to amputate the hypertrophied parts which may obstruct the cervical orifice, care being taken so to dissect up the mucous membrane as to have a flap to cover the wound. We often, moreover, in such cases succeed by means of dilatation.

IV.

UTERINE DEVIATIONS.

At a certain epoch, a school, of which Velpeau was one of the principal heads, considered deviations as dominating almost the entire pathology of the uterus, and consequently as being a frequent cause of sterility. To-day, also, some gynæcologists attribute a great importance to them.

According to the researches which I have made on this subject, and after an experience of many years in gynæcological practice, I am led to believe that writers have greatly overstated the pathological action of the different varieties of version and flexion. These act much less by themselves than by the complications which attend them, principally metritis, perimetritis, salpingitis, and pelvi-peritonitis.

We say that there is deviation of the uterus whenever one or more of its axes no longer present their natural direction.

In the physiologically normal woman the uterus is mobile around an axis which may be regarded as represented by the insertion of the vagina on the cervix, by the utero-sacral ligaments, and by the intimate union which exists between the bladder and the antero-superior part of the cervical segment. Its means of suspension and fixation, extremely lax, permit it to follow, in part, the movements of the body,

according to the position of the subject. Its physiological mobility is maintained only on condition that the ligaments still possess their normal laxity. If from any cause they become rigid or shortened in any part, the uterus is fixed in a pathological situation.

When the organ is deviated in totality, we say there is a *version*.

When the body alone is modified in its situation, the cervix preserving its normal axis, we say there is a *flexion*.

There is *anteversion* or *anteflexion* when the fundus of the uterus is directed too far forwards, *retroversion* or *retroflexion* when it is misplaced backwards. We speak of *falling of the womb*, or *prolapsus*, when the whole organ is lower down in the pelvis than it ought to be; the uterus is *elevated* when it is above its normal plane.

The deviation which is of the most importance from the point of view of sterility is *anteflexion*; and yet I have seen women become pregnant despite an anteflexion so great that the fundus uteri was situated on the same plane as the inferior extremity of the neck.

Sometimes the anteflexion coincides with an arrest of development, the uterus having the characters which we have before described. In these cases the deviation plays no part; it is the incomplete development of the organ which opposes fecundation.

Retroflexion does not generally prevent impreg-

nation from taking place, but it constitutes a cause of relative sterility in exposing the patient to one or more successive abortions. It is ordinarily about the third month that the ovum is expelled.

The question has been raised whether pessaries are indicated to facilitate fecundation in cases of malposition of the uterus. Doubtless the employment of an appropriate pessary has at times proved to be beneficial, and Sims narrates several instances in his experience. For my own part, experience in displacements has made me less and less an advocate of pessaries, of which the use in most cases presents more disadvantages than advantages to patients. If the intent be only to resort to the pessary to facilitate impregnation, these disadvantages will be less marked, the pessary being kept in but a short time—not long enough to become a source of irritation and infection.

Struck by the little effect exercised by vaginal pessaries on the situation of the fundus of the uterus when ante- or retro-flexed, some authorities have counseled intra-uterine pessaries. It is especially in antelexion followed by dysmenorrhœa and sterility that this mode of treatment has been advised.

It is certain that some have obtained success by their employment. But along with advantages very questionable, the sojourn of a rigid stem in the uterine cavity presents grave inconveniences and serious dangers. Hence I have seen reason to reject these stem pessaries altogether. In cases of antelexion

such as I have mentioned, it is better to have recourse to dilatation of the cervical canal.

Suggestions given to wives as to the position to take during coitus, may often be of service.

In cases of retroversion, some authorities have advised the parties to practice coitus with the woman in the knee-elbow position. Edis pretends to have obtained numerous successes by this simple expedient.

The indications of this sort vary with each case, and of course are utterly different according as there is anteversion or retroversion. It is for the physician to suggest them when he shall have determined the state and situation of the organs in the different postures.

Prolapsus may prevent procreation. At the same time, physicians have often enough seen women become pregnant despite a complete prolapsus; in these cases the uterus may be pushed back and reduced by the act of coitus, or the extremity of the virile member may penetrate directly the dilated cervical canal.

I shall not speak here of inversion of the womb, which is, evidently, an absolute cause of sterility. Its rareness, besides the gravity of the symptoms to which it exposes the patients, take from it almost all interest relatively to reproduction.

The *elevation of the uterus*, apart from certain anatomical curiosities, is almost always symptomatic of peritoneal adhesions, or of tumors developed in the uterine walls or annexes—as fibroids, and cysts of the ovary.

In these conditions the cul-de-sacs are effaced, and the fundus of the vagina is constricted in the form of a tunnel. Its walls are smooth, and lose the folds and rugosities of the normal state. The os tincae is shortened, and constitutes at the base of the tunnel a little tuberosity hardly appreciable.

Writers have considered elevation of the uterus as a cause of sterility by emphasizing the difficulty with which the fecundating liquid reaches the cervical orifice. This affirmation *a priori* cannot, as it seems to me, hold its ground against the cases, relatively sufficiently numerous, where conception takes place despite the persistence of the hymen. In short, this variety of displacement of the uterus does not furnish any absolute obstacle to fecundation, but only renders it more difficult. We must also take account, in such cases, of the greater or less energy and vitality of the spermatozoids.

V.

METRITIS.

The different forms of uterine inflammation may present an obstacle to fecundation. I have shown elsewhere* the reasons which have led me to divide the metrites into mucous and parenchymatous metritis, according as the lesions of the mucosa dominate, or those of the fibro-muscular parenchyma.

It is the chronic forms which interest us especially from the point of view of sterility.

It is principally when the alterations affect the mucosa that women are liable to become sterile. Metritis may be the consequence of menstruation, especially at the moment when this function is established, or when it ceases. I have often seen metritis develop at the epoch of puberty or of the menopause. But what dominates the etiology of this affection is puerperality and, above all, local infection due to the introduction of micro-organisms into the uterine cavity.

It is generally by the pathogenic process of infection that accouchement and abortion are made the starting-point of metritis. We may say the same of blennorrhagia, which plays so important a part in

* De Sinety, *Traité de Gynecologie*, 2d ed., 1881.

the development of the genital diseases of women, and of sterility.

We insist on these facts by reason of their primordial importance in relation to sterility. In a great many women affected with metritis, we find, on inquiring into their antecedents, that their disturbances of health came on shortly after their marriage. A few weeks after the first sexual relations the young wife is taken with malaise and with pains in the abdomen accompanied by a muco-purulent discharge. On interrogating the husband, he will tell you that he had a gonorrhœa a few months or a few years before, but that he was completely cured, only a slight urethral discharge remaining—the *goutte militaire* or military drop, as it is called, appearing in the morning on waking.

Without realizing the danger, he has infected his wife, and in the products of the secretion the gonococcus of Neisser is found.

Generally in these conditions the blennorrhagia remains limited to the cervical canal, but too frequently also it spreads to the mucosa of the body and tubes, as we shall see when we come to salpingitis. Sometimes a careless examination, an abortion, or an accouchement acts as an incidental cause in the spread of this infection.

Some authorities have also affirmed that excess of coitus may be influential in the development of metritis, and they have referred to the frequency

of this affection in prostitutes. I do not deny the possibility of this interpretation, especially if these sexual excesses take place at the moment of the menses, or if they coincide with other fatigues, as those of the wedding journey. But in many cases of this kind it is a latent blennorrhagia which is the cause much more than the too frequent or too energetic repetition of the sexual act.

In cases of old metritis, often going back several years, the dilatation of the body of the uterus and the atrophy of the mucosa render less easy the fixation of the ovum. When the alterations are principally noticed on the part of the cervical segment, their significance is different according as we have to do with multiparæ or nulliparæ. In the former, future conceptions are not at all hindered, unless, indeed, the cervical cavity be completely obliterated by cystic productions (such as masses of Nabothian ovules). In nulliparæ, on the contrary, impregnation is often rendered difficult. We must not forget that, contrary to an opinion that is widespread, inflammation of the uterus is not rare in the young girl, especially in the first periods which follow the establishment of puberty.

The action of parenchymatous metritis on sterility depends less on the modifications of structure of the uterine tissue itself than on the complications which accompany it, especially perimetritis. The latter acts in various ways, whether in fixing abnor-

mally or in obliterating the pavilion of the tube (as we shall see when we come to salpingitis), whether in separating the ovaries from their physiological relations, or in preventing the expulsion of the ovules by an environment of neo-membranes.

If despite these difficulties conception takes place, the adhesions generally yield little by little under the influence of the progressive dilatation of the uterus. Or if, perchance, they are too resistant, the gestative organ is impeded in its development and the embryo is prematurely expelled.

Fecundation often follows closely recovery from metritis. Hence it is necessary to treat the uterine affection in order to cure the sterility.

Warm vaginal irrigations (48 to 56° C.), with the addition of boric acid, followed by dressings with tampons of iodoform or borated cotton soaked in glycerin, will give good results.

In chronic mucous metritis—for the acute form does not interest us here—besides the general treatment, the practitioner will have recourse to cauterizations of the cervical cavity with tincture of iodine, chromic acid, or other caustics. I give the preference to chromic acid, on condition that an excess of the liquid shall not be employed and that an injection of warm water be made immediately after cauterization before withdrawing the speculum. It is especially in cases of abundant muco-purulent catarrh of the cervix that we are, subsequent to these applications, to look

for good effects from the modifications of the mucosa or its glands relatively to the obstacle which the state of this mucosa and its products of secretion present to impregnation. When the lesions exist above the internal orifice, the modifying agent should of course be applied to the cavity of the body of the uterus.

In that form of metritis called parenchymatous, scarifications of the cervix are useful, especially in the first periods. It is during these first periods that a well directed treatment often cures the metritis and the sterility resulting from it.

Some have suggested to associate with the scarifications interstitial injections of creasote—a mixture of equal parts of beechwood creasote, alcohol, and glycerin being injected in the neck of the uterus by means of a Pravaz syringe. One of the lips of the os tincæ is chosen as the seat of the puncture, and a few drops of the solution are injected deeply into the tissues. Auvard and Touvenani* advise to inject only one lip at a time.

In the secondary or induration period, our principal resource consists in applications of the hot iron to the cervix. This means, very much in use several years ago, is less employed to-day, despite the facilities furnished for its execution by Paquelin's cautery.

Much as we may count on the success of treatment at the onset of the metritis, we cannot be very

*Semaine Médicale, December, 1891.

sanguine of good results in the more advanced phases of the disease when the uterine tissue is profoundly modified in its structure.

In cases of mucous metritis, if the divers means put in use remain without effect, we should have recourse to curettage of the uterine cavity.

Thanks to the progress due to antisepsis, this operation occupies to-day a great place in the treatment of the metrites. Within a few years, there has even been a tendency to abuse it; nevertheless, in rebellious cases, where simple means have failed, curetting is undoubtedly of great efficacy.

Although curetting constitutes an operation that is but slightly painful, it is better to give ether when this operation is attempted. Many surgeons advise that the cervix uteri be first dilated. This is generally needless; nine times out of ten the curette penetrates without difficulty. If, however, resistance should be met, the desired result will be easily obtained by the aid of Ellinger's dilator, or by forcible dilatation of the cervical canal with two or three graduated bougies.

The proper time to operate is the first few days after cessation of menstruation.

The patient being placed in the dorso-sacral position, the thighs elevated and supported by two assistants, the os uteri is brought down to the vulva by means of a volsellum forceps which is made to catch hold of the anterior lip. The sound is passed into

the uterine cavity to obtain information as to the direction and depth of the uterus; then the curette is introduced—preferably a blunt curette—and the various parts of the mucous membrane are scraped, from the beginning of the cervical canal to the fundus, care being taken to include the angles. The scraping should be sufficiently energetic to remove about all the mucous membrane. The curette is then removed, and the uterine cavity well irrigated with a hot solution of carbolic acid (1-per-cent.), a double catheter being used and at least a pint of the solution injected. This thorough washing of the uterine cavity is both styptic and antiseptic, and removes all clots and débris. The sound is then removed, and replaced by the cannula of a Braun syringe, filled with tincture of iodine or perchloride of iron, and the contents of the syringe are injected *guttatim* as the cannula is withdrawn. During this latter process an assistant makes upon the neck of the uterus a continuous irrigation with full stream, in order to dilute and wash away the excess of liquid which would otherwise cauterize the vagina and vulva. After a final lavage of the uterine cavity, practiced with the double-current catheter, the volsellum forceps is removed. The uterus is restored to its place, and kept there by a pledget of iodoform gauze introduced into the fundus of the vagina, and left there for three days. Then a vaginal irrigation is practiced morning and evening with a sublimate solution 1:2000. It is sometimes useful, in

cases of very inveterate metritis, to make every second day after curetting an intra-uterine injection of tincture of iodine.

Among the accidents which may result from curetting, writers have noted perforation of the uterus. Generally the operator is warned when he has overpassed the limits of the mucous membrane, by the difference of consistence of the tissues. At the same time, in certain conditions after accouchement or recent abortion, the uterine parenchyma softened and thinned out may be perforated with a facility that one would not expect. This danger may be obviated by using a dull curette, made to scrape obliquely with relation to the surface.

The hæmorrhage which accompanies the operation may be easily controlled by the astringent injections.

As for the peritonitis, so formidable formerly after operations practiced in the uterine cavity, we no longer observe it, owing to our antiseptic precautions.

The remote consequences of curetting have a notable interest from the point of view which especially concerns us. The uterine mucosa has a great aptitude for reconstruction, and by virtue of the curettage you will have substituted a new regenerated mucosa in an aseptic medium for a tissue infected by pathogenic germs, whose profound modifications would have been long in disappearing without energetic local treatment of the kind described.

According to the observations collected the past few years, 30 per cent. of patients that have undergone this operation have become pregnant. The fecundity of woman, instead of being compromised by the curettage, is enhanced thereby in considerable proportions.*

In a certain number of subjects after accouchement, there will be observed a persistent laceration of the neck, existing generally on the left side, but sometimes on both sides. Ordinarily this does not entail any pathological trouble. When it is very pronounced, dividing the os tincae to its vaginal insertion, it sometimes causes pain and an abundant catarrhal discharge. Here Emmet's operation, *trachelorrhaphy*, will be indicated. This consists in freshening the edges of the laceration, and uniting them by several points of suture.

There has been much discussion relative to this operation. Some accuse it of producing sterility; others think it a means of facilitating conception. It is shown by the most recent publications on this subject that the plastic operations—amputation, resection, suture of lacerations—practiced on the cervix uteri, do not prevent its dilatability, but are followed by union by first intention without production of retractile cicatricial tissue. We have not, then, to fear sterility or dystocia as a consequence of Emmet's operation when carefully performed.†

* Pozzi: *Traité de Gynécologie*, 1890, p. 210.

† Duchasse: *Thèse de Doctoral*, Paris, 1889.

But trachelorrhaphy has been abused. If it is indicated in some cases, in many others it is useless. Authorities have exaggerated the evils of lacerations of the cervix, attributing to them abortions, menorrhagia, and sterility. In some patients for whom Emmet's operation had been proposed, I have obtained a cure without resorting to the knife, by means of applications of tincture of iodine or chromic acid so as to obtain a gradual reunion of the angles of laceration. With the local applications, I am in the habit of employing dressings with tampons of glycerin and tannin.*

* Introduce morning and evening into the vagina as deeply as possible, tampons of borated gauze or wadding soaked in the following mixture:

R	Glycerin.....	3j.
	Tannin.....	3j.

M.

On removing each tampon, give a hot douche with a 2:100 boric acid solution.

VI.

TUMORS OF THE UTERUS.

The neoplasms of the uterus have a very variable action on fecundation.

Fibromyomata have been considered by many authorities as a resultant of want of function of the uterus. This view seems to-day to be without foundation, and every one is agreed in regarding these tumors not as a consequence but as a frequent cause of sterility. It is not, however, known whether they act by preventing the congress of the two reproductive elements, or by the endometritis which accompanies these morbid growths, or whether by abnormal contractions they cause the premature expulsion of the products of conception.

The subserous variety acts by the intermediation of the local peritonitis which it occasions, or by the fact of the pressure exercised on the uterus and the contraction which results.

The interstitial or submucous fibromata have a greater importance by reason of the hæmorrhages and excessive catarrhal fluxes to which they give rise. They constitute also a mechanical obstacle, by obliterating, more or less, the divers regions of the uterine cavity. This result attends for the most part the pediculated or polypoid tumors, whether these belong to the fibroid or to the mucous variety. These

latter may also be the occasional cause of an extra-uterine pregnancy when seated near the orifice of the tubes, by producing a partial obliteration, insufficient to prevent the passage of the spermatozoids, but sufficient to prevent the fecundated ovum from entering the uterine cavity.

I have seen women who had been sterile for several years, become pregnant after the ablation of a polypus, especially in cases of mucous polypi projecting between the lips of the os tinæ.

All that it is necessary to do in order to rid patients of these morbid growths, is to seize the little tumor with a polypus forceps and to perform evulsion with several twisting movements. When the pedicle is too thick to permit removal in this simple way, you may have recourse to the *écraseur*. After extirpation, it is a good plan to touch the point of implantation with a camel-hair pencil saturated with a solution of perchloride of iron, as the vascularity of this form of polypus exposes the patient to the dangers of hæmorrhage.

It is also by means of the *écraseur* or tight ligature that the gynæcologist ordinarily removes pediculated fibromyomata, or fibrous polypi.

If ablation is impossible or contra-indicated, the preparations of ergot of rye may prove to be useful, whether under the form of ergotine or ergotonine in hypodermatic injections, or that of fluid extract introduced by the digestive passages.

I am myself partial to the powder of ergot in doses amounting to 7 to 10 grains (40 to 60 centigrammes) per day; I usually follow a fortnight of treatment by a fortnight of suspension of the remedy. The cessation of the metrorrhagia obtained by this treatment may suffice to permit impregnation.

When the tumor is very large, it may do more harm than good to bring about conception. In fact, the presence of a large fibrous foreign body aggravates considerably the prognosis of pregnancy, being liable to cause abortion or to increase the danger of dystocia.

The influence of uterine cancer on fecundation is as variable as that of fibromyomata. Conception has often taken place in these conditions, but in general the pregnancy is interrupted. The exact seat of the neoplasm has a great significance from this point of view. When the lesions do not extend above the internal os, gestation ordinarily goes to the full term.

VII.

AFFECTIONS OF THE TUBES.

The diseases of the tubes, and especially their inflammations (salpingites), have acquired a great importance in gynæcology during the last few years. This importance is no less from the special point of view which interests us here.

Lesions of the tubes cause sterility by interposing a mechanical obstacle to the passage of the ovum and spermatozoön. But even if this obstacle did not exist, the alteration of the liquids resulting from these lesions has an injurious influence on fecundation. At the same time, the fact that there are two tubes diminishes a little the chances of these pathological states entailing sterility, as both must be affected in order to prevent procreation. It has, moreover, been demonstrated that the ovule may pass from one side to the other—*i. e.*, if expelled from the right ovary, it may penetrate the left tube, and *vice versa*.

Various arrests of development may affect these tubes—sometimes at one of their extremities, more rarely at other points of their course. Their absence or rudimentary state coincides generally with a lesion of the same order on the part of the uterus. The lumen of the tubes may be congenitally obliterated throughout its entire length, or there may be complete stenosis of one or more points. In some cases the

abdominal orifice is contracted and scarcely visible in the midst of the fimbriæ, which are rarely wanting.

Tubal deviations are consecutive to the presence of uterine or ovarian tumors, to displacements of the uterus, and above all to inflammations or adhesions which fix them in the most various situations. The fixation of the tube in any abnormal situation is in many cases accompanied by obliteration of the pavilion.

Obliteration of the oviducts may occur in any part of their course; more particularly at one of their abdominal or uterine extremities, whether consecutively to a peritoneal inflammation, or under the influence of a neoplasm or of a thickening of the mucosa.

Salpingitis often hinders fecundation by the fact of simple swelling of the mucosa, or by the obliteration of the folds which it presents in the normal state, and the disappearance of its vibratile epithelium. If the lesions are double, sterility will be the necessary consequence; but when they are seated only on one side, it is rare that the other has not also lost its physiological properties under the influence of the catarrhal inflammation.

Women affected with salpingitis present varied symptoms. They almost always complain of a pain seated in the lateral and inferior region of the abdomen, in the neighborhood of the groin. These painful sensations manifest themselves generally under the form of lancinating twinges, and are exasperated by

the vaginal or rectal touch and by abdominal palpation.

The physician also notes by these divers modes of examination a diminution of mobility of the uterus, and a tumor more or less voluminous, rugous, and very sensitive to the pressure of the exploring finger. Sometimes the little painful mass exists exactly on one of the sides of the uterus, separated from this organ by a more or less well-marked furrow; sometimes, on the other hand, it seems to be situated behind the uterus.

Writers have divided the salpingites, according to the nature of the pathological exudate which fills the tube, into hydro-salpingitis, catarrhal salpingitis, pyosalpingitis, hæmato-salpingitis, and tubercular salpingitis. These divisions, which are very interesting to the anatomic pathologist, have no great importance from the point of view of sterility.

We find for inflammation of the tubes the same pathological causes which we have indicated under the head of Metritis.

In the first place, puerperality, and especially the premature expulsion of a foetal product, *i.e.*, a miscarriage of from six weeks to three months.

In the second place, blennorrhagia. This disease, localized generally in the urethra or the vagina, may, and often does, invade the uterus and extend into the Fallopian tubes.

It is not always necessary that the disease should

be manifested primarily by a blennorrhagic vaginitis. It sometimes begins with the uterine mucosa, and from there gains the tubes. These utero-tubal blennorrhagias often pass unperceived. They are generally the consequence of sexual relations with a man who presents only the characters of a gleet, and in whom the phenomena of acute urethritis have long since disappeared. How many married couples have I seen where the woman had become sterile under these conditions without dreaming that the husband was the cause of her sterility!

In most cases of salpingitis, the ovary and peritoneum adjoining are also affected. In many subjects the inflammation of the tube gets well under medical treatment; warm vaginal irrigations with boric water are useful. The patients must keep their bed, and the irrigation is to be made while they are lying on a bed-pan. A fountain syringe and a douche pan are indispensable. I have, also, often employed with success applications over the lower abdomen of compresses wet with the mother-water of Salies; these are covered with oiled silk.

Blisters, once used, have really but a slight action in the relief of pain, and have been superseded by punctiform cauterizations.

Some authorities have counseled dilatation of the uterus as a means of curing salpingitis. I have little faith in dilatation, and I may say the same of curettage. Local massage, recommended by some, appears to me to be dangerous and irrational.

In the treatment of chronic salpingitis, pyo- or hydro-salpingitis, it must not be forgotten that the result to be accomplished includes not only the disappearance of the pathological troubles, but the restoration of the anatomical and functional integrity of the organ.

To obtain this double result, some surgeons have recourse to puncture followed by aspiration, as in purulent collections situated in other regions. This is not the place to set forth the technique of this operation, which will be found described in the treatises on surgical gynæcology.

When all modes of treatment have failed, there remains laparotomy followed by ablation of the diseased tubes. This operation, which has been successful in rebellious cases where everything else has failed, does not present great utility from the point of view of sterility. Removal of the two oviducts renders infecundity absolute and irremediable. Perhaps, however, in certain cases where only one of the tubes is diseased, its ablation may be an aid towards fecundation by promoting restoration of the general health; the remaining oviduct would then be sufficient to subserve impregnation.

VIII.

AFFECTIONS OF THE OVARIES.

We come now to the lesions of the ovaries, whose importance is the more evident from the fact that these organs contain the principal element of reproduction, the ovule. The absence of both ovaries, as an abnormality existing alone, is a fact so rare that I have yet to find a well authenticated instance of its existence.

The absence of the two ovaries almost always coincides with other arrests of development, incompatible with life. The old authorities have related cases where atrophy of the ovaries seemed to result from torsion of the ligaments. Such atrophy has been said to follow general diseases, such as chlorosis, scrofula, tuberculosis, rachitism, or the abuse of alcohol or opium. In most of these cases, doubtless, the absence of menstruation has led to the conclusion that the ovaries were atrophied.

Rudimentary ovaries ordinarily coincide with congenital lesions of the uterus. At the same time, this relation is not necessary; and instances have been known of a rudimentary uterus with normal ovaries performing their function perfectly. This corresponds, moreover, with what we know of the independent development of both sets of organs.

The histological examination of rudimentary

ovaries has shown, sometimes, that the ovules and follicles were wanting; sometimes, on the contrary, in these glands reduced to very minute dimensions, the existence of ovules has been noted.

The absence or rudimentary state of the ovaries is not recognized during life by any certain signs. It has been stated that this anomaly was linked to permanent amenorrhœa. Now it is well proved to-day that amenorrhœa may exist despite very well developed ovaries and an active ovulation. It has also been affirmed that the privation or want of activity of these organs produces notable changes in the form and external *habitus* of the woman. These relations are far from being constant. It is shown, in fact, by the most recent researches on this question, that the feminine type is perfectly compatible with congenital atrophy or incomplete development of the two glands, and that the apparent sexual characters are quite independent of these abnormal conditions.

The ovaries, moreover, do not seem to have any effect on the sexual appetite. This is often *nil* in women whose ovaries are normal and perform their function well, while I have seen women exceptionally passionate whose ovaries were only rudimentary.

In short, ovarian anomalies may be suspected but not affirmed during life. The aphorism, *Propter solum ovarium mulier est quod est*, is only true relatively to reproduction; but here its signification is absolute, and when atrophy or arrest of development

blights the ovaries, there results a sterility that nothing can remedy.

If we suppose that the infecundity depends on an incomplete development or insufficient functioning of the ovaries, manifesting itself by absence of the periodical flux or by feeble and irregular menstruation, it is chiefly to the general modifying agents (hygienic, stimulant, alterative) that we should have recourse.

Moderate exercise in the open air, associated with hydrotherapy, massage, gymnastics, will constitute a series of means that are very useful. We may say as much of thermal water-cure treatment, especially the sulphur waters, or sea-baths if the patient is lymphatic. If the appetite is poor, cinchona or other bitters, as columbo and quassia, may be given internally.

Iron should be given with prudence in conditions of this kind. In fact, when you observe prolonged amenorrhœa in a young girl who has passed the age of puberty, you should always be suspicious of tuberculosis; and if this suspicion is well founded the preparations of iron are more often injurious than useful, and should be given with great caution. It is chiefly in true chlorosis that iron gives some success. It acts much less efficiently in the other forms of anæmia, as that which frequently accompanies the arrests of development of important organs.

Divers pathological alterations of the ovary are also a cause of sterility.

Among these, *ovaritis*, or inflammation of the ovaries, has been mentioned by almost all writers. At the same time, those who have the most insisted on the importance of ovaritis have recognized that an inflammation limited to this gland is rare. Ovaritis has been divided, from an anatomical point of view, into *follicular* and *parenchymatous*. Sclerosis is the lesion which corresponds to the generality of inflammations, subacute or chronic. At the start, it is not incompatible with ovulation; but if it becomes more pronounced, the follicles are compressed and atrophy. The compression of the nerve-filaments, produced by the sclerosis, has been considered as a frequent cause of nervous disturbances, for which surgeons have too often practiced ablation of the ovaries.

Some cases have been reported in which the lesions were said to have started in the ovarian stroma itself. But almost always the alterations of the ovary are secondary.

I believe that authorities have overestimated the importance of ovaritis in the pathology of the woman, and consequently in its relation to sterility.

It follows from my anatomo-pathological researches, that in chronic ovarites the glandular lesions almost always are developed secondarily. They consist for the most part in thickening of the external coat, and are accompanied by salpingitis, pelvipерitonitis, and lymphangitis.

In these circumstances the causes of the infe-

cundity are complex; it results, perhaps, from the fixation of the ovary away from the pavilion of the tubes, or is perhaps due to lesion of the tube itself, or to the envelopment formed by exudates and false membranes; lastly, to the disappearance or atrophy of the follicles, sometimes of all the ovarian tissue—we find, in such a case, at the autopsy the two glands degenerated and transformed into pus-sacs.

The pains which are provoked in certain women by pressing over the ovarian region are in no sense pathognomonic of inflammation of the ovary, as some authorities have affirmed. They are observed equally in cases of salpingitis, of pelviperitonitis, and especially in hysterical women in the absence of every appreciable anatomical modification.

When I have examined *post-mortem* the genital organs of hysterical patients who have showed in the intensest form this local hyperæsthesia, I have never met with inflammation of the ovary.

Writers have much exaggerated the sensibility of the ovary in the normal state. It is easy to assure yourself of this in cases where, by reason of the relaxation of the tissues, you are able to seize the gland between the two fingers introduced into the vagina, and the two fingers of the other hand which depresses the abdominal walls.

The etiological importance attributed to onanism and to sexual excesses is more a theoretical idea, in connection with the hypothetical and exaggerated

rôle formerly attributed to the ovary in the pathogeny of diseases of women, than a result of observed facts.

I would accept with extreme reservation statements which have been made connecting double ovaritis and consequent sterility following mumps. The scant observations on record have never been subjected to anatomical control. I may say the same of syphilitic ovaritis.

The medical treatment of inflammations of the ovary presents nothing special, and is the same as that which we have counseled for salpingitis.

As for the surgical treatment, which consists in removing the diseased organs, it has no interest from the point of view of the treatment of sterility, as it renders the latter absolute and certain if both ovaries are extirpated. Removing one diseased ovary may facilitate fecundation by arresting the suffering and the divers pathological manifestations.

We know very little about the affections of the follicles of the ovary and the ovule. In the infant, and even in the adult, a great number of the follicles undergo atresia, and the ovule disappears little by little without being expelled. Certain grave fevers and general diseases, as tuberculosis, seem to favor this retrogressive degeneration.

We are warranted in supposing that, pushed beyond its physiological limits, this process may go so far as to destroy all the follicles, and consequently to

entail sterility. This is, however, nothing but a hypothesis, with no positive facts to support it.

The degenerations of the ovaries, fibrous, cancerous, tuberculous, cystic, may prevent conception. It is then essential that both glands shall be affected throughout their whole extent.

As for the cysts of those organs, we often see the normal ovarian tissue persist, despite the considerable volume of the tumors. In cases where I have noted this persistence, the Graafian vesicles were met with only in the neighborhood of the pedicle. The neoplasm would act, then, in this case rather by modifying the relations of the ovary and tube than in preventing the production or expulsion of ova. But in many large ovarian cysts the Graafian follicles cannot be found on any point. Hence fecundation is impossible if both ovaries are completely transformed. Hernia of the ovaries is very infrequent, and presents a minimum importance relatively to our subject. Moreover, published observations show that the gland continues to functionate, despite the abnormal situation.

IX.

PELVIPERITONITIS.

The inflammations of the pelvic peritoneum, or pelviperitonitis, play an important part in the etiology of sterility. The medical literature of the last few years has a little diminished this importance, by showing that many symptoms attributed to pelviperitonitis are due to salpingitis. It is no less true that, with or without salpingitis, the peritoneal inflammation often brings in its train absence of fecundity. Few affections have given rise to so much discussion and to theories so diverse as the inflammations of the pelvis. According to some authorities, they are localized in the peri-uterine connective tissue or in that of the broad ligaments. According to others, the peritoneum is alone affected. Others still incriminate chiefly the lesions of the lymphatic system.

The confusion which results from these opinions, contradictory in appearance, is due to the fact that each writer has drawn general and absolute conclusions from one or two observed cases, and would refer all others to the same category.

It is rare, moreover, that the lesions are exactly localized in any one point. In most patients the pelvic peritoneum is not alone affected; the uterus, tubes, and ovaries are equally more or less altered.

To-day we are more and more disposed to con-

sider pelviperitonitis as a consequence of the introduction of morbid germs into the peritoneal cavity. The increasing successes of intra-abdominal surgery bring every day fresh arguments to the support of this view.

We shall find, then, here again the etiology which we have mentioned under the head of Metritis and Salpingitis, which diseases are ordinarily the point of departure of the inflammation of the connective tissue or of the neighboring peritoneum.

It is principally in women who are in all the activity of their sexual life that we observe these affections of the pelvic tissues. They are almost never met after the menopause or before puberty.

The disturbances of menstruation have been said by many writers to produce accidents of this kind observed in virgins. These are, sometimes menstrual irregularities or a sudden suppression of the menses, sometimes dysmenorrhœa or veritable menorrhagias. In most of these cases, if we interrogate the patients carefully, we find in their antecedents attacks of metritis or salpingitis, which, rather than any menstrual troubles, account for the pelvic inflammation.

Blennorrhagia, after its propagation to the uterus and tubes, is often the cause of pelviperitonitis. In these circumstances the peritoneal accidents develop ordinarily about the thirtieth day, and never before the eighth, after the onset of the specific affection.

Sexual excesses, especially during menstruation; the introduction of a sound or of an intra-uterine pessary; a douche upon the cervix; even a simple touch, have sufficed to produce a pelvic inflammation. Most of these facts belong to the same category, *i. e.*, to the presence of morbid germs, whatever may have been the vehicle of their introduction — hystrometer, finger, syringe cannula. Hence it almost seems superfluous at the present day to insist on the necessity of thoroughly sterilizing and disinfecting every instrument designed to be introduced into the uterine cavity.

What dominates the etiology of pelviperitonitis, as well as that of most of the affections which we have reviewed thus far, is puerperality, and especially an abortion badly treated without the necessary precautions of antisepsis and rest.

From a clinical point of view, pelvic inflammation takes on different aspects according to the period when it is observed, and according to the parts of the uterine annexes more especially affected.

In some women, we see appear in the neighborhood of the uterus masses more or less voluminous accompanied by pains, especially under the exploring touch. These local tumefactions sometimes disappear in a few days, with a promptitude which surprises the observer. I have compared these facts to the fluxions of the cheek consecutive to caries of the teeth.*

* See my *Traité de Gynécology*, second ed., 1884.

But things do not always go on so favorably, and in a great number of cases the pelvic inflammations give rise to morbid accidents very intense and of long duration, terminating by resolution or by suppuration.

The patients complain of a pain which is more or less intense in the lower parts of the abdomen; a pain which is aggravated by pressure over the abdomen, and more still by the vaginal touch. By these modes of exploration the uterus is found to be less movable than ordinarily, or even to be completely fixed. There exists, moreover, in its vicinity, in front, behind, or on one side, a mass more or less resistant, adherent, difficult to limit, and very sensitive to pressure. Women thus affected have ordinarily the face pale, sallow, sunken, and emaciated; the eyes are without expression; the skin dry, sometimes hot toward evening, especially if there is tendency to suppuration. Sexual intercourse is in general painful.

These symptoms often cease, only to be reproduced after a variable time, whether at the moment of menstruation, or under the influence of some great fatigue. These recurrences constitute one of the characters of pelvic inflammation.

The violent attacks of colicky pains which often take place in these patients have been ascribed to salpingitis. The affections of the tubes are, in fact, accompanied by colics recurring in paroxysms. But constipation and meteorism play also a part in the

causation of such painful phenomena, and I have noted them in patients who did not present any sign of salpingitis, and even in men. If I insist on this point, it is because these attacks, of a very painful nature, due to the accumulation of gas in the intestine, are often the cause of mistakes of diagnosis. Women have a tendency to refer them to a uterine affection. When in these conditions they ask advice of a physician little familiar with gynæcological practice, he examines with a speculum, finds a slight redness about the os and cervix, such as is very frequent in many women and is perfectly normal. He makes the blunder of applying lunar caustic every two or three days. He does this so faithfully, that at the end of a few days or months the patient, who had at the start nothing but a little colicky pain due to gas in the bowels, becomes a victim of metritis or perimetritis, bringing in its train sterility.

I have seen cases of this kind, and have occasion to refer to them frequently in my professorial work, in order to caution against this cause of error young practitioners but little experienced in the diagnosis of diseases of women.

In patients affected with pelvic inflammations, examination by means of the speculum is not only very painful, but it does not give any information. Hence it is well, as far as possible, to abstain from them, and even to avoid too often-repeated digital explorations.

Pelvic peritonitis is a frequent though not absolute cause of sterility by obliteration of the tubal ducts or fixation of the ovaries and tubes in relations incompatible with fecundation. If pregnancy supervenes in these conditions, its course is often difficult and painful till about the fourth month, and abortion is quite likely to take place in the earlier periods.

The inflammations of the pelvic peritoneum act, as we have just said, by the intermediation of adhesions in modifying the relations of the organs, and thus preventing the ovules expelled from the Graafian follicles from getting into the tube. The same result may also take place without change of situation, solely by certain modifications of the epithelium which unites the ovary to the tube.

It has long been believed and taught, that under the influence of the muscular fibres which enter into the structure of the broad ligaments, the pavilion of the tube grasps the surface of the ovary, from which it is separated by a considerable distance, in order to receive the contents of the follicle.

This hypothesis is not in accordance with recent researches, which have demonstrated the existence of currents directed from the ovary towards the pavilion. These currents entail the progression of the ovules in this direction. They are produced under the influence of the cells with vibratile cilia which invest the neighborhood of the tubal extremity.

The direct continuity of this epithelium with

that of the ovary is not even necessary to explain this migration, for the vibratile elements determine at a distance currents in the circumambient liquids. This epithelial zone has a considerable importance relatively to sterility. If the vibratile cells have disappeared—under the influence of an inflammation, for instance—the ovule can no longer reach the oviduct, and falls into the peritoneal cavity, where it is absorbed, unless, in the event of fecundation having taken place in the vicinity of the gland, there results an extra-uterine pregnancy. Here, too, it is the pelviperitonitis or perimetritis, however slight, which plays the principal rôle, whether this be or be not consecutive to a lesion of the uterus or of the tubes.

The first morbid accidents frequently go back to the time of the nuptials, to that period in the life of the woman when fashion, often so little in harmony with good hygiene, imposes all the causes of danger on organs which ought not to be subjected to undue excitement and disturbance in the new and quite special conditions in which the young bride finds herself. Among these absurd customs, the habit of the wedding journey, so common in the wealthier classes, is one of those against which I have most often had occasion to protest.

In nearly half of the women that are sterile, we find traces of old exudations, indicated by nodosities, by bands felt by the touch, or by a diminution in the mobility of the uterus. Therefore it is very import-

ant in cases of this kind to interrogate the patients respecting their antecedents and any previous abdominal troubles which they may have had—however little marked at the time of their occurrence.

The treatment of pelvic inflammations at their acute period hardly concerns us here. Although practitioners have employed ice, collodion, inunctions of belladonna, and, later on, vesicatories, punctiform cauterizations, paintings with tincture of iodine, these divers means have not had a great influence on the resorption of exudations or adhesions, which interest us especially here as interposing hindrances to fecundation. If we have not at our disposal therapeutic means capable of preventing the organization of the neo-membranes, are we any more abundantly provided with means for dispersing these productions? Without being very positive on this point, I think, nevertheless, that we are too prone, in treating these chronic inflammations of the pelvis, to trust exclusively to the expectant method and to rest in bed. Thus abandoned to itself, the disease has sometimes an almost indefinite duration, while the means which I am about to indicate have sometimes seemed to me to hasten the cure and facilitate the resorption of adhesions. The period of acuteness must have completely disappeared before we can interfere advantageously to obtain this result.

In the first place, I am in the habit of advising my patients to take full alkaline baths, having care

first to introduce a little speculum into the vagina, and to keep it there during the bath. The introduction of this instrument is easily accomplished by the patient herself.

The artificial alkaline baths are advantageously replaced in warm weather by the water-cure treatment at the thermal stations, such as Salies, of Bearn, and Salins, at Jura, especially in lymphatic women. In other patients, of nervous temperament, you can have recourse to Neris, Plombières, or Vichy. Certain patients will find themselves benefited by the sulphur springs. Whatever may be the thermal station which you may select, you must caution your patients against vaginal injections and douches at high pressure, which may reawaken acute symptoms. The application of faradic electricity every few days is also indicated. One of the poles is introduced into the vaginal cul-de-sacs, the other being placed over the abdominal walls. Electricity acts perhaps in these cases by bringing about the contraction of the smooth muscular fibres which enter so largely into the structure of the ligaments and annexes of the womb, perhaps also in energizing the local circulation.

Whatever theory you may adopt in explanation of its action, I believe I am right in affirming that electricity thus employed is a useful agent in the treatment of chronic circum-uterine inflammations.

It is a good plan also to employ as an adjuvant local massage, seeking by this means to impress on

the uterus or on the indurated products which surround it certain movements and certain gentle pressures, which, however, must not go far enough to cause or to intensify pain.

I hardly need say that perimetritis and pelvi-peritonitis are affections which are often for a long time difficult to cure, and whose consequences are almost sure to entail sterility.

It is even true that in certain women all surgical interference is practically impossible; and the moment they quit their bed and undertake to walk a little, the painful manifestations return.

Happily, these unfavorable cases are the exception. To patients that do not belong to this class, I counsel moderate exercise, which must be regular, repeated every day except at the menstrual period, when complete rest is enjoined. I shall not speak of the divers internal medicaments which may also be indicated, such as iron, quinine, cod-liver oil, and small doses of iodide of potassium. These remedies have in certain cases a favorable influence on the general health, but have no action on the local alterations.

I may add that for those patients whose stomach functionates poorly, you should be very sparing of internal medication.

Through the various means which I have mentioned, you will now and then hasten the disappearance of adhesions, stigmata of old inflammations, which prevent impregnation.

The surgical treatment of this kind of lesions has made great progress the past few years. In many cases where we formerly advised to refrain from operative means, we now counsel surgical interference. But this subject, so interesting from the point of view of the health and the life of women, has but little relation to the treatment of sterility.

To conclude what pertains to this topic, I will say a few words about the prophylaxis of pelvic inflammations.

The more you study this question of the infecundity which so often attends marriage, the more you will come to the conviction that when the wife is the cause the sterility often goes back to the time of marriage, and to an attack more or less slight of pelviperitonitis, often consecutive to an early abortion which passed unperceived, or to an old blennorrhagia unconsciously communicated by the husband to his newly married wife.

The exaggerated fatigues which often accompany the first periods of married life ought to be avoided as much as possible. We can hardly compare the delicate, pale, nervous women of our large cities, and their offspring, to the robust women of the country or of our sea-coasts. The social environment, the physical education, the civilization, create wants and new susceptibilities which do not exist in opposite conditions.

Hence I would advise newly married couples to

seek some quiet country place where they can have, during the first weeks which follow their union, freedom from the excitement and fatigues of a wedding journey by rail. This, though contrary to custom, is in the interest of a sound hygiene.

X.

TROUBLES OF MENSTRUATION.

The troubles of menstruation are often accused of being the starting-point of infecundity. I shall pass in review the most important pathological modifications of this function.

I need only recall to mind that in the woman in the normal state, from the age of 15 years to 45 or 50, there takes place every month by the genital passages a flow of blood varying from 100 to 250 grammes and lasting from four to six days.

This physiological function may undergo certain changes, certain deviations from the normal type, and thus constitute a pathological menstruation.

. We call *precocious menstruation* that phenomenon in which not only the flux of blood but all the signs of puberty manifest themselves in children long before the age when these signs are expected. The external manifestations are accompanied by a menstrual flow lasting three or four days and returning regularly. Despite these precocious hæmorrhages, certain of these subjects do not present any disturbance in their general health. The periodical flux once established continues generally till the adult age; at other times it ceases after lasting several years. In cases of this kind, or at least in some cases, the menstruation exists

with ovulation, as is shown by the fact of accouchements at $7\frac{1}{2}$ years, at 8, 9, 10, and 11 years.

This premature evolution in the child coincides sometimes with an exaggerated fecundity on the part of the mother.

Writers have also cited cases of *retarded menopause*. To say nothing of the earliest observations, which lack scientific verification, modern writers, as Raciborski, Puech, Courty, Beigel, have noted the persistence of the menstrual flow in women of 56 and 57 years, and this with a continuance of unimpaired general health.

In old women affected with uterine cancer the metrorrhagia sometimes takes on the periodical character of the menses, and one should be very careful before pronouncing an opinion respecting the nature of a sanguineous discharge in an old person, however much it may resemble true menstruation.

Amenorrhœa is the absence of the periodical hæmorrhage. This condition may depend either on the non-occurrence of the hæmorrhage, or on the existence of an obstacle to the issue of the blood, which remains pent up in the uterine cavity, as in atresia or stenosis of the cervix.

The absence of menstruation results either from a uterine affection, or from troubles of nutrition, or from general diseases. Chlorosis, coming on shortly after puberty, is one of the most common causes. Tuberculosis is another general disease which may entail amenorrhœa.

There is a transitory amenorrhœa produced by psychical causes. It is certain that a fright, unexpected bad news—in a word, any strong depressing emotion—may suddenly arrest the monthly flux. The fear of being pregnant has more than once in unmarried women caused suspension of the menses; facts of this kind I have myself witnessed.

The absence of the menses is ordinarily a sign of sterility, absolute or relative, according as the amenorrhœa is permanent or transient.

We observe transient amenorrhœa in the physiological state during pregnancy and lactation.

During pregnancy, the exceptions are so rare that they are denied by many authorities. In most cases of so-called menstruation in pregnancy, the hæmorrhages are simple metrorrhagias due to divers pathological causes which an attentive examination may easily ascertain.

During lactation, the exceptions to the statement made above are of frequent occurrence, and it will not do to attach a great importance thereto. I have had occasion to see a great many nursing women, with healthy infants at their breast, who regularly menstruated all through lactation.

The coincidence of amenorrhœa with inaptitude to conceive, while being a general law, is far from being absolute. Many times I have seen nursing women become pregnant without having once menstruated since their last confinement.

It is the same with permanent amenorrhœa, which ought to be considered as a probability of sterility, but not a certainty.

The following fact is conclusive in this regard. It concerns a woman aged 37 years, married at 19, without ever having menstruated. She had nine normal pregnancies, of which the first immediately followed her marriage. Her health was always good, she always nursed her children, and yet she never menstruated.

In other cases the menstrual flow does not show itself until later. Lœwy cites the case of a woman aged 31 who had six children without ever having menstruated; the menses appeared at that age for the first time.

In a great many young girls at the onset of puberty we see periods of amenorrhœa lasting several months, after one or two menstruations. Mothers are often very much concerned about these arrests of the menses, which have no importance, especially if they coincide with a satisfactory state of the general health. It is only necessary to wait a while, and by degrees the periodical flux will become regular; there is no warrant for much dosing and for *forcing* measures, such as are frequently resorted to. I have known serious gastric troubles to result from the violent remedies (oil of savine, etc.) given at such times.

In what we call *deviated menses* the courses are wanting, or, being insufficient, periodical hæmorrhages

take place from other parts of the body. These bloody fluxes have in general their seat in the mucous membranes—nasal, pulmonary, gastric, or rectal. At other times there are tumors, ulcers, wounds, which regularly give issue every month to a certain quantity of blood.

As fluxes of this kind periodically appear in some subjects, and even in men, we should be reserved in the interpretation of the facts. But there certainly are circumstances where these hæmorrhages replace menstruation.

The reappearance of the menses coincides frequently with the return of fecundity; hence the treatment of amenorrhœa presents a real interest here. If the absence of menstruation is dependent on a uterine affection or a constitutional disease (tuberculosis, syphilis), it is this that we should attack. It is the same with chlorosis, whose cure suffices to restore menstruation and fecundity.

When we have reason to suppose a want of action of the utero-ovarian apparatus, it is the first duty to try and reinvigorate function by hygienic measures: gymnastics, exercises, promenades in the open air, associated with warm and cold douches and hydro-therapeutic practices in general. You may order besides, sulphur baths, frictions of the lower limbs with alcohol, warm foot-baths or sitz-baths, the application of sinapisms to the inner aspect of the thighs.

Repeated catheterism of the uterine cavity has

been attempted with the view of thus exciting the vitality of the mucosa. Some have even advised the use of intra-uterine pessaries. These means, in our judgment, merit condemnation.

Divers authorities have vaunted the employment of electricity. Some have made use of faradic currents, with the rheophores applied to the cervix or vaginal cul-de-sac and over the abdominal walls.

Others have made use of direct currents, and have claimed good results not only from electrizing the region of the pelvis, but also from the application of the current to the neck in the neighborhood of the cervical lymphatic glands, and the upper part of the spine.

In cases of excessive adipose development (which is regarded as one cause of amenorrhœa and sterility) you will prescribe an appropriate dietetic regimen composed of meat, green vegetables, and a little wine. The patients should drink as little as possible, should abstain from all farinaceous food, and should eat no bread unless it be toasted. Besides, twice a week a saline purge should be administered, as one or two glasses of Rubinat water.

Milk diet has also been employed with success in the treatment of amenorrhœa in women afflicted with polysarcia.

I advise you, as a general rule, to be shy of substances reputed to be emmenagogue, such as aloes, rue, saffron, savine, pilocarpine, and permanganate of

potash, the effect of which is often disastrous to the stomach. At the same time, certain forms of amenorrhœa are favorably influenced by medicaments of this order. But, I repeat, you ought to exercise great caution in resorting to such remedies.

When the menstrual flow exceeds the normal conditions, whether in duration or quantity, we say that there is *menorrhagia*. This differs from *metrorrhagia* in that the flow of blood takes place at the regular menstrual epoch, while in *metrorrhagia* it takes place at irregular periods. The excessive losses of blood are a possible cause of sterility, and render women liable to successive abortions which often pass unperceived.

Menorrhagia is frequently symptomatic of a lesion of the uterus or its annexes. It has been witnessed in connection with general diseases such as scurvy, purpura, Bright's disease, in enfeebled women whose nutrition has suffered.

The treatment of menorrhagia consists, first, of rest in bed, the head low, the pelvis elevated. Cold or very warm water renders great service in cases of abundant menorrhagia. Remember when you employ cold, that it must be continuous, otherwise you will produce the contrary effect from what was intended. I much prefer, however, hot irrigations (110°–120° F.) with boiled water containing boracic acid ($\frac{1}{2}$ oz. to the quart). The irrigations may be repeated three times a day, the patient being on her

back, the pelvis slightly raised. Hot-water bags over the lumbar region are also useful, as I have many times had occasion to observe.

You may associate with these means the preparations of ergot under the form of powdered ergot, ergotine, or ergotinine.*

In cases where the menses are prolonged beyond ordinary conditions, you will often derive benefit from the employment of perchloride of iron, administered by mouth, in the dose of 4 drops three times a day, in a little sweetened water, at meal-times. Some authorities speak well of the infusion of black coffee, in cups taken several times a day.

I have often employed with success *Hydrastis Canadensis*, the fluid extract of which may be given in 20-drop doses at meal-times.

If the menorrhagia is symptomatic, it is against the principal affection that the treatment should be directed.

* Ergot of rye in powder is a valuable preparation of which I make much use. But I cannot too strongly advise to pulverize the ergot at the moment of using it. I am in the habit of ordering the patient to take in cachets (wafers) twice a day for fifteen days, a powder composed of 6 grains of recently pulverized ergot with 10 of yellow Peruvian bark. After fifteen days of medication, fifteen days of rest, then begin the treatment again. You thus institute a series of successive treatments, with an interval of a fortnight between when the medicine is suspended. I have found this method to work well in many cases.

When the menses are normal, the sensations experienced by women at such times are rather disagreeable than painful; whence the common expression, "I am indisposed." These painful sensations may attain a certain degree of acuteness, and become real suffering; we call this *dysmenorrhœa*.

Dysmenorrhœa is often accompanied by sterility. Out of 250 women married and sterile, observed by Sims, 120—*i. e.* nearly one-half—complained of painful menstruation.

Dysmenorrhœa is frequently symptomatic of an affection of the uterus or its annexes, principally of the tubes.

It may depend on a mechanical obstacle, or on an arrest of development coincident with an anteflexion. At other times it results from the presence in the uterus of a foreign body which produces exaggerated contractions, whence the pain. A little polypus situated at the internal os gives rise to a dysmenorrhœa, which ceases when the polypus is removed. The condition is about the same when the uterus is diminutive, and when the tissues have lost their normal suppleness and elasticity; the vascularization is impeded, the swelling of the mucosa is hindered, and the nerve extremities are compressed and give rise to the pain.

Most of the observations of *congestive* dysmenorrhœa mentioned by writers seem to be in relation with a chronic metritis, the pains of which are exasperated at the moment of menstruation.

The variety called *nervous* is often linked to a lumbo-abdominal neuralgia, or, rather, it is not a nervous dysmenorrhœa, but a neuralgia with a uterine *point douloureux*, which becomes more intense under the influence of the catamenial congestion. In these patients you will find in the interval of the menses a permanent sensitive point at the junction of the cervix and body. Very often these cases are confounded with dysmenorrhœa and treated as such, to the great detriment of the patients, by dilatations, incisions, cauterizations, etc.

The dysmenorrhœa called *ovarian* is seen especially in cases of salpingitis.

Many young girls suffer at the time of menstruation, in the first periods which follow puberty, the uterus not having yet acquired a development sufficient, and all becomes normal after a year or two, and especially under the excitations due to sexual intercourse.

When a foreign body is the cause of the dysmenorrhœa, this may be formed by clotted blood, or by shreds of mucous membrane which sometimes attain considerable dimensions and then constitute *membranous* dysmenorrhœa.

The difficulty which attends the expulsion of these products is due either to their size or to the fact that the os and cervix are too much contracted to allow them freely to pass. Stenosis of either orifice is a very frequent cause of such dysmenorrhœa; this

anatomical fault often accompanies incomplete development of the uterus. If the accession of blood to the uterine cavity takes place little by little, its expulsion from that organ will be easily effected, even with a straitened orifice. If, on the contrary, the flow of blood is abundant and sudden, and the liquid cannot find an easy vent, the uterus is distended, and the patient suffers severe pains. Then it is that clots more or less decolorized are expelled, which constitute one of the varieties confounded under the name of membranous dysmenorrhœa.

I group under this denomination all the cases where violent menstrual pains are followed by the expulsion of a membraniform product.

Authorities have perhaps too much considered membranous dysmenorrhœa as one single and same affection, a sort of morbid entity, when, on the contrary, it seems to be produced in widely different states, instead of being always dependent upon a mucous metritis.

There are patients who do not present any sign of uterine inflammation, who are perfectly well in the intervals of menstruation, and only suffer at their monthly periods, when membranes more or less voluminous are expelled.

In these cases the macroscopic characters of the expelled products are absolutely insignificant. Whatever may be, in fact, their nature, they all have the same tendency to mould themselves to the uterine cavity, of which they present the form.

The composition of these pseudo-membranes is very various, and the histological examination alone can indicate the structure. I have observed decolorized clots, mucus coagulated and mixed with a greater or less quantity of figured elements, membranes of vaginal origin easy to recognize by the large flakes of pavement epithelium, and shreds of uterine mucosa, sometimes sound, sometimes showing the lesions of internal metritis.

I consider this latter affection as a frequent, but not the sole, cause of membranous dysmenorrhœa.

The study of the changes which take place in the uterine mucosa at the time of menstruation has much elucidated the pathogeny of true membranous dysmenorrhœa without concomitant metritis. We know, in fact, that at this epoch the glands elongate and enlarge, that the tissues thicken and become infiltrated with embryonic elements. These changes are produced slowly and before the sanguineous discharge.

In the normal state, the blood oozes through the superficial vascular network of the mucosa. But when the escape of the blood is hindered at this point, the hæmorrhage takes place at the expense of the deep vascular network: the effused blood infiltrates the tissues and compresses the vessels, and there is hence elimination of the portion of the mucosa situated above this layer. This interpretation, which I gave ten years ago in a memoir presented to the Academy of Medicine, seems to me to be only con-

firmed by the lapse of time. The explanation, then, is, that everything which prevents the blood from flowing, as in the ordinary conditions, by the superficial vasular network of the mucosa, may be a cause of membranous dysmenorrhœa.

Stenosis of the cervical orifice augments the difficulties of expulsion and the acuteness of the symptoms. These may also be witnessed even with a normal os and cervix, if the product to be eliminated is voluminous.

Lastly, some women present an exaggerated nervous hyperexcitability which, with normal anatomical and physiological conditions, causes them to suffer much more in menstruating than ordinary women.

The dysmenorrhœic pains have a character which is quite special. They are veritable uterine colics, radiating toward the lumbar region and the inferior extremities. They are sometimes intermittent, and cease for a time, to return again with renewed violence. At other times, oftener even, they are continuous, and present without much regularity exacerbations. These sufferings may acquire an extreme degree of acuteness; the patients writhe in bed, and utter groans and cries.

Despite this train of painful symptoms, the temperature remains normal. These attacks manifest themselves habitually before the flow makes its appearance externally, and cease when the foreign body

has overcome the obstacle, at which time they may disappear all at once.

One may ordinarily distinguish clinically the cases which depend on salpingitis, pelviperitonitis, or metritis, from those where the accumulation of blood pent up in the uterus is the cause of the painful crisis.

In patients of the first class you will observe, even in the interval of the menses, divers pathological accidents, such as frequent colics, abdominal and lumbar pains, evening fever, and vomiting. Besides, you will generally find, on practicing the vaginal touch, the local signs of inflammation of the uterus or its annexes. Marriage has not generally any favorable action on this variety of dysmenorrhœa, which is, on the contrary, aggravated by coitus, and followed by sterility.

In women of the second group, there is usually no trouble during the intermenstrual period, and the sexual relations may bring about a definitive cure, especially if there exists incomplete development of the uterus.

In stenosis of the neck and os, without arrest of development, the patients experience uterine colics which keep on increasing in severity till the blood finds issue. These pains are several times repeated in the same menstrual period, and are each time followed by a more abundant flow of blood.

In other cases, there is first a little flow of blood without pain, then there is a violent uterine colic, and

a clot is expelled. In these cases of true stenosis, the first menstruations are often normal, and the menses only little by little become painful. It is, in fact, easy to understand that when there is but little blood to eliminate, this more easily passes through a narrow orifice than when the quantity is augmented, as ordinarily happens after several menstruations.

Little by little these exaggerated congestions act on the uterine tissue, principally on the mucosa, and entail at length a chronic metritis, the symptoms of which are only aggravated by coitus and marriage.

It is especially membranous dysmenorrhœa which merits our attention from the point of view of sterility.

Most women who present this variety of menstrual accidents are and remain sterile. I have, however, several times seen patients thus affected get well of their menstrual troubles, become pregnant, and go on to their full term.

The first precaution to take before instituting a treatment in a subject affected with dysmenorrhœa, is to make a histological examination of the expelled products. It is very evident that the therapeutic means will differ completely according as you have to do with a product of abortion, with coagulated mucus, or with a sound or altered uterine mucosa.

If there is found to be stenosis of one of the orifices, the treatment will be chiefly mechanical.

Sims counseled incision of the external os.

This little operation is not always safe, and I

prefer gradual dilatation by means of aseptic sounds introduced in the cervical cavity and allowed to remain ten minutes or a quarter of an hour at a time; this can be done every other day.

When there is only stenosis of the neck, with an organ normally developed, a single dilatation sometimes suffices to accomplish a complete cure.

If, as oftener happens, the constriction is accompanied with arrest of development, local excitations, principally sexual approaches, will be followed speedily by the disappearance of the painful accidents and by fecundation. Besides, under such circumstances, it is well to advise, several days before the probable epoch of the menses, very warm vaginal irrigations, and dry or wet cups over the lumbar region.

The dysmenorrhœa complicating chlorosis will be benefited by certain ferruginous preparations, inhalations of oxygen, and all means that improve the tone and condition of the entire organism, among which we may enumerate, as first in order, a generous diet, hydrotherapy, sea-baths, and sojourn in high altitudes.

When it is the uterine mucosa which is expelled, in whole or in part, the histological examination of this mucosa gives us valuable data from a therapeutic point of view. If it is sound, possessing all its glands and its normal epithelium, there is an indication to practice several scarifications of the cervix in the days which precede the menses. Above all, dilatation of

the cervical canal is called for. This is the means which has given me the best results in cases which I have designated under the name of simple membranous dysmenorrhœa.

If, however, the mucosa presents the lesions of internal metritis, it is to this affection that the treatment should be directed. In inveterate and rebellious cases, good results have been obtained by curetting the uterus.

As for internal remedies, the pain demands attention, and must be relieved by opium, Indian hemp, and other narcotics, if the simpler remedies, as viburnum, Jamaica dogwood, pulsatilla, and analgesin, fail. There is much testimony favorable to analgesin, which may be given in doses of 7 or 8 grains every hour till the pain is subdued. Salicylate of soda has been given in 15-grain doses every hour with advantage. Four to six capsules of apiol may be given daily during the two or three days which precede the advent of the menses.

Lavements of chloral and opium, opium suppositories, hot applications over the abdomen, will aid in assuaging the pain.*

* The following lavement is recommended:

Chloral hydrate.....	2 grammes (3 ss).
Tinct. opii deodorizata.....	gtt. x.
Water.....	60 grammes (3 ij).
Yolk of egg.....	No. j.

M.

If the suffering is intense, it will be necessary to resort to hypodermatic injections of morphine.

In several cases I have succeeded in causing the menstrual pains definitively to disappear, despite the persistence of the expulsion of membranes, by practicing every day, from the onset of the menses, two hypodermatic injections of morphine, of one-twelfth to one-sixth of a grain each, one in the morning and one in the evening, till the expulsion of the membraniform products. Under the influence of the morphine, if the pains reappear at all, they are very feeble. It is not rare, after having repeated this treatment at five or six catamenial periods, to see the menses become perfectly normal, attended with no pain. The morphine seems to act here as in certain neuralgias which are relieved at first and afterwards completely cured by its use.

I have several times seen fecundation follow the cure of the dysmenorrhœic attacks. Castration or Battey's operation, the ablation of the tubes, has been proposed in certain cases of rebellious dysmenorrhœa. The results of these operations, based on false or undemonstrated theories, do not seem to me to be sufficiently encouraging to warrant us in resorting to them in these circumstances. This is, however, a question which does not belong to us to discuss here, as these surgical operations have for their sure consequence an irremediable sterility.

XI.

GENERAL CAUSES, ACTING MORE OR LESS ON PROCREATION IN BOTH SEXES.

Omitting the consideration of the modifications which the reproductive function may undergo in the acute diseases, and which are temporary, we may turn our attention to the chronic diseases which are regarded as presenting impediments to fecundation.

It is very certain that every grave disease which affects the individual has an influence on all the organic functions, the reproductive included. But it is no less true that women in advanced periods of chronic diseases may become pregnant. This is of frequent observation in connection with tuberculosis.

I have already mentioned *blennorrhagia* as a cause of sterility, when treating of salpingitis, pelvi-peritonitis, and metritis. Has this disease a more general influence on the organism? I do not think so. And the remote blennorrhagic manifestations, such as the affections of serous membranes, the arthrites, and the pericardites, have no action on the reproductive faculties. Gonorrhœa is, however, none the less one of the principal causes of sterility by the local lesions which it causes.

In man, the specific inflammation, having commenced by the urethra, propagates itself by the vas deferens to the epididymis, and gives rise ultimately

to an obliteration which occupies principally the tail of the epididymis. One may notice here a little induration. This induration, when it exists on both sides, almost always entails sterility, at least when it has lasted several months. After five or six months every attempt at treatment fails, and the patient, if both epididymites are taken, is forever sterile, although he may have preserved his venereal desires, and his aptitude for coitus may not be impaired.

In the female, the consequences of blennorrhagia are no less detrimental to reproduction. I need not repeat what I have said about the pathogeny of the sterility which accompanies the lesions of the tubes, ovaries, or perimetrium, thereby resulting. But I cannot too much insist on this fact: that many young husbands, without knowing it, communicate to their wives a disease of which they thought themselves long cured, and which no longer manifested itself except by a slight matutinal blennorrhœa on squeezing the meatus. It must be borne in mind that in these cases there are none of the ordinary symptoms of blennorrhagia — neither vaginitis nor urethritis. The contagion is communicated directly to the uterine cervix. How many women are all their life deprived of the joys of maternity from this cause alone!

It is sometimes difficult to decide if these chronic discharges, these *gouttes militaires*, are or are not contagious. Often there remains, as the last symptom of a urethritis, only the presence in the urine of little

filaments, constituted by epithelial cells and globules of pus mixed with mucus. These products of secretion, coming chiefly from the prostate gland, are swept along by the first jet of urine. It will not do, however, to infer that all subjects presenting these filaments are liable to infect their wives, as some have affirmed. The urine of many men contains these products while devoid of all contagious elements.

It will be useful in cases of this kind to make the histological examination of these filaments. If these are composed entirely of mucus and epithelial elements, there is no reason to fear for the wife the consequences of sexual intercourse. If, besides epithelial cells, you observe globules of pus, and perhaps gonococci, you should put the party on his guard against the dangers which may result to the health and fecundity of his future spouse.

Likewise, in the woman, it is important not to confound blennorrhagic urethritis with non-contagious urethrorrhœa. The microscopic examination of the products excreted will here too clear up the difficulty. In the first case the liquid is constituted of pus globules more or less mixed with large pavement epithelial cells and numerous gonococci. In the second, there are only epithelial cells and no gonococci.

Even by the naked eye, with a little practice you will learn to differentiate the two sorts of discharge. The one is always more or less yellow or greenish, the

other pale and lactescent. It is safer never to trust the macroscopic appearance, and always to resort to the microscope in such cases.

My researches, and those of Henneguy and myself, have disproved the theory advanced by Martineau that blennorrhagic pus is always acid. In most of the cases of blennorrhœa without gonococci, the liquid is acid, while it is alkaline in the urethra, cervix uteri, and vulvo-vaginal glands in cases where the gonococci are abundant.*

When the gonorrhœal alterations are produced in the internal genital organs (epididymis for the male, ovaries or tubes for the female), all therapeutic measures are generally disappointing relatively to sterility. Hence the necessity of treating blennorrhagia from the onset in both sexes, and continuing the treatment till all traces of the disease have disappeared.

When you have to do with a specific vaginitis, you must endeavor to prevent its extension to the cervix. The absence of glands in the vaginal mucosa explains to us why we ordinarily soon succeed in causing the gonorrhœal discharge to cease when its seat is in this region. To produce amelioration of the vaginitis, all that it is necessary to do is to apply dressings of tampons of absorbent cotton, gauze, or wadding, saturated in coal tar or creoline. These dressings should be frequently renewed—at least two

* Henneguy and De Sinety, Soc. de Biologie, August, 1885.

or three time a day; and the pledgets should be pushed up as far as the bottom of the vaginal cul-de-sacs. Wipe away with care all excess of liquid, lest it should irritate the vulva.

When the blennorrhagia has reached the urethra or the internal mucosa of the cervix, its treatment is often long and tedious. It is then necessary to apply the antiseptic substance to the whole extent of the cervical mucosa, by means of a uterine sponge-pro-bang. When the disease affects the urethra, you will resort to injections, thrown in with great care and allowed to remain in contact with the diseased parts a certain time before withdrawing the cannula.

Chlorosis is often accompanied with sterility. I have seen chlorotics who had been barren for many years, become pregnant when rid of their chloro-anæmia under an appropriate treatment.

We do not know much about the relations which exist between *diabetes* and *albuminuria* and the faculties of reproduction, except so far as they enfeeble the organism in accordance with the law of functional solidarity. These diseases may entail a great diminution in the genesic energy.

Where an *excessive development of adipose tissue* entails inaptitude for fecundation, you will prescribe a special dietetic regimen composed of lean meats, green legumes, and a little wine. The patients should drink as little as possible, and abstain from bread and farinaceous substances. Besides, twice a week you

will administer a mild purgative. Exercise in the open air, massage, electricity, certain mineral waters, will be useful auxiliaries of the divers means which I have indicated.

Tuberculosis, considered from the point of view of procreation, acts generally by creating local lesions—of the testicle, epididymis, ovary, and especially of the tubes.

In many male subjects you will no longer meet with fecundating elements in the products of ejaculation, long before the invasion of the genital organs. In seventy-six cadavers of tuberculous patients, Lewin found spermatozooids in only ten.

It is none the less true that these reproductive elements have been observed in subjects far advanced in tuberculosis. In reality, contrary to a widely spread opinion, the tuberculous are generally but little prolific. Still a great many tuberculous persons reproduce with facility—are too prolific, we may say, for the good of the race, and particularly of those whom they procreate.

Syphilis is a quite frequent cause of sterility in man. From this point of view, syphilitic sarcocele has been considered as producing inaptitude for procreation by its known tendency to invade both testicles. Cases are on record where, despite the disappearance of the sarcocele and an apparent return to health, the sterility persisted, the testicular tissue having undergone profound modifications. These

lesions are sometimes circumscribed, sometimes diffuse. They often leave the epididymis intact, which, if invaded at all, is not taken till later. The integrity of the vas deferens has been indicated as a valuable diagnostic sign in cases of this kind. When the lesions are double, the subjects are generally infertile and sometimes impotent, as is the case after castration.

It is not merely the extent of the testicular lesions which has importance from this point of view. It is, in fact, rare that the disease invades both glands in all their regions. Despite this, the absence of zoö-sperms is observed very often, even without anatomical alterations of the genital organs, as is proved by the findings of about half the autopsies.

In the female, syphilis acts chiefly as a cause of abortion, frequently of an early abortion which passes as a rather profuse menstruation.

In both sexes fecundity has been often restored, where the sterility was of syphilitic origin, by the specific treatment of iodide of potassium and mercurials.

The different diatheses, which are variable according to races, have an undeniable action on the aptitude for procreation.

I may say the same of certain nervous diseases.

Certain epileptics, insane persons, etc., of both sexes, become sterile, though still strong, long before the advanced periods of their disease. In these cases the sterility is rather favorable to society, by dimin-

ishing the number of degenerated subjects and of the feeble-minded, neuropathic, or criminal classes, so often the offspring of neurotic parents.

At the extremes of life the two sexes have the greatest resemblance to each other. In infancy there is no well marked sexual difference—in the aspect and demeanor, or in the character and tastes. So also the aged person, of either sex, becomes wrinkled and bent, the hair turns white or falls out, and the teeth decay and perish.

It is only during the period of activity of the genital organs that each sex presents all its characters—characters which are in great part dependent on the modifications which the sexual organs undergo.

Castration, effected early, takes from man his masculine aspect. The adipose system develops at the expense of the muscles. The eunuch's voice, his absence of beard, his rounded form, give to him a feminine appearance.

On the other hand, we see in women who have passed the period of genital activity that the graceful contours of youth are lost, the beard grows, and a more or less masculine aspect gradually asserts itself. The same thing is noted in certain animal species whose aspect is essentially different according to sex. Of birds which possess lively colors, as the peafowl, females which are too old to lay eggs sometimes take on the brilliant plumage of the male.

In a general way, the more pronounced the sex-

ual characters the more certain we can be of the aptitude of the parents for reproduction. All the senses, touch, sight, smell, act with a variable energy but in a constant manner on the genital sense. The latter is also influenced by the activity of the cerebro-spinal centres. Who has not noted in this respect the effects of the imagination or of cerebral overwork?

Moreover, all the motive principles of life, more or less modified or transformed in appearance by civilization, may be reduced to two: the conservation of the individual; and the conservation of the species, or procreation.

It remains to consider certain general causes which, in both sexes equally, affect the aptitude for reproduction.

We cite first of all, nutrition. A multitude of facts show the intimate relation which exists between the functions of nutrition and generation. How often gastric troubles are accompanied by a diminution in genetic power!

It has long been a subject of observation, that years of famine are followed by a notable diminution in the number of births.

But if too marked privations are injurious to procreation, a similar result is brought about by an excess in the opposite direction, *i. e.*, by an exaggeration of nutrition. I have already called attention to obesity as a factor in sterility.

Moderate exercise of the genital organs acts favorably on the functions of nutrition, excites the appetite, and enhances the spirits; while the privation of sexual pleasures causes languor, produces obesity, and renders the subject morose and crabbed. The abuse of sexual pleasures has equally an injurious action.

Hence the double influence, reciprocally favorable, of a good nutritive and proper genital hygiene.

It is very difficult to tell exactly where the abuse of the genital functions begins. Few physiological phenomena present greater individual varieties than the aptitude for coitus. Hence the advice of those who counsel the cessation of sexual relations at 50 or 60 years of age, is rarely listened to.

When sexual intercourse is followed by a prolonged sensation of fatigue and exhaustion, by a marked degree of inaptitude for all intellectual or muscular exercise, this is an indication that the healthful physiological mean has been passed. This is a reason why at any time of life, and especially at an advanced age, all factitious excitations should be avoided, and the venereal act should only be indulged in to satisfy the spontaneous and manifest wants of the organism.

Without denying that sexual enjoyments, when indulged in to excess and too often repeated, may in the long run be a cause of sterility, I believe that this cause is rarely observed alone, and that many authorities have assigned to it a far more important part than it merits.

The age of the procreators has a great influence on the reproduction of the species.

Generally the spermatozoids do not appear in the sperm till about the age of puberty; Mentegozza has never met them before the age of 18. It is true, as this writer remarks, that his observations pertain to poor peasants, badly nourished, and some of them the victims of malaria, and that in better conditions the secretion may take place much earlier. Schlemmer has seen in adolescents, not yet fecund, the spermatozoa smaller than in the adult.

At the other extreme of life, it has been proved that spermatozoa may exist in individuals of a very advanced age. They have been found in the sperm of a man aged 86 years, and in at least half of the octogenarians who have been examined.

It seems probable, from numerous facts (the researches of Duplay, Dieu, and others), that the presence of spermatozoids, even when possessing the normal aspect, is not sufficient to warrant one in affirming the fecundating quality of male sperm. It is still necessary that the spermatozoids shall possess an activity, a vitality sufficient for them to reach the ovule and fecundate it.

In the old man the spermatic liquid is sometimes modified in its aspect and in its color. Few or no spermatozoa are then found, the latter being replaced by blood or pigment resulting from hæmorrhages, old or recent. At other times the fecundating elements

are wanting, despite the transparent and colorless appearance of the liquid.

In old men, we sometimes meet with cysts of the epididymis, partial thickenings of the tunica vaginalis, which have not at all hindered the generation of spermatozoids. It is the same with senile modifications of the testicle—diminution of weight, of volume, of consistence—which, in many persons, coexist with the presence of zoösperms.

The generative faculty does not attain its height in either sex until after the full development of the organism, and it becomes extinct when the general vitality diminishes.

Although the limit of the age for procreation of even healthy children is very extensive in both sexes, yet the epoch of life most favorable for obtaining the best products is from 22 to 25 years in the male, and from 19 to 21 years in the female.

It is especially in the female that the age has the most importance. In our country, few young girls ought to be married before the age of 17, and late marriages are equally prejudicial. Numerous examples of these facts are furnished by the researches of modern demography.*

* Kisch, in 556 women married between the ages of 15 and 19 years, has seen fecundation take place in the first fifteen months of marriage in the proportion of 54 per cent., while in subjects married between the ages of 20 and 25 years the proportion reached 67 per cent., independently of every appreciable pathological state.

Some writers have assigned to divers *temperaments* a rôle in reproductive activity; but there is no evidence, in my judgment, that any one temperament has any advantage over every other in this respect.

At the same time, it is evident that individuals—male or female—whose functions are exercised with regularity and energy, are better procreators than those who are infirm or subject to sickness.

I must here say a few words relative to frigidity in both sexes.

In man, the absence of venereal desires—or frigidity—amounts practically to impotence. In woman it is not so, and many women submit to coitus all their lives without experiencing any voluptuous sensations.

There has been much discussion respecting the utility of these sensations in woman, relatively to her aptitude for fecundation. Some writers have maintained this utility: Roubaud, for instance, affirms that in order that the venereal erethism may be experienced in woman it is necessary that there shall be integrity and normal functioning of the following organs: (1) Of the bulb of the vagina and of its constrictor muscle; (2) of the intermediate vascular network which connects the bulb and clitoris; (3) of the clitoris, and especially of the free part of the gland; (4) of the genital nerves, which should remain in perfect relation with the central nervous system. It is by the absence of one or more of these con-

ditions that he explains certain cases of frigidity supervening after an accouchement that has produced lacerations of the vulva—a frigidity that lasts a long time, often through the entire life of the woman.

Complete congenital erotic insensibility is a rare phenomenon. When the advent of puberty and the fact of marriage fail to awaken in the woman any susceptibility to voluptuous sensations, it is generally laid to the account of the husband, or to a want of harmony or proportion in the organs of the two parties. And yet absolute idiopathic frigidity, by vice of temperament (as it was formerly called), does really exist.

It has also been alleged that the cervix uteri possesses a special excitability, more or less independent of all voluptuous sensations, which facilitates the penetration of the sperm. If this is so, the diminution or loss of this excitability would be an impediment to fecundation. This uterine erethism is admitted by several physiologists.

Some have explained in the same way the little liability to conception which is remarked in prostitutes. This view is supported by the fact that prostitutes, when they marry and settle down to regular habits of living, become pregnant under the sole influence of relative repose of the genital organs; impregnation having been wanting till then, despite numerous and varied sexual relations continued during many years.

It is true that in prostitutes we very often meet with metritis, salpingitis, or pelviperitonitis—important factors, as I have already shown, in the etiology of sterility.

Prostitutes often use, to prevent conception, cold injections and douches with medicinal and toxic liquids designed to kill the spermatozooids. At the same time, this means is not so efficacious as might be supposed, for Kaussman has found living and moving spermatozooids in the neck of the womb several days after coitus, although frequent injections of a solution of sulphate of copper had been taken to prevent conception.

Lastly, in the sterility of prostitutes, much account should be made of the frequent abortions in this class of women, whether such abortions are provoked by artificial means or are produced naturally. These abortions often pass unperceived and are taken for difficult menstruations or for membranous dysmenorrhœa.

I have learned from my own researches, that in prostitutes, more than in any other class of women, what dominates the etiology of sterility is the presence of specific contagious diseases—syphilis and blennorrhagia, and their consequences more or less remote; the first manifesting itself by repeated abortions, the second giving rise to inflammations of the tubes and pelvic peritoneum.

Writers who have incriminated the want of ex-

citability of the cervix uteri, have also admitted a sterility by excess of sensibility of this organ, as when there is excess of sexual passion.

The influences, conscious or unconscious, of the nervous system on fecundation, are still very obscure. Nevertheless, we sometimes see aptitude for impregnation and the awakening of voluptuous sentiments develop simultaneously and continue, after being lacking for several years.

Courty cites the case of a woman somewhat advanced in years, who, after fifteen years of infertility despite the most perfect health, had a first child by her lover, followed shortly by two others of whom her husband was the father. The voluptuous sentiment had not been awakened in her previous to the time of her first conception.

But statements of this kind, where the affirmation of the woman is one of the principal elements of certainty, must be accepted with much reservation, especially when you consider the propensity of some women, and especially hysterical women, to deceive for the pleasure of deceiving and when there is no personal advantage to gain.

Whether or not nervous excitations facilitate fecundation, there are a great many facts on record that show that women indifferent to sexual pleasures and without erotic sentiment may become pregnant, and even as a result of coitus with men toward whom they have antipathy. Others have become pregnant

as a consequence of rape or during anæsthesia by ether or chloroform. Lastly, the success obtained by artificial fecundation demonstrates that the organic act which constitutes conception does not demand necessarily the voluntary participation of the woman.

In favor of the views which I have set forth, cases have been cited of women that have been sterile with one husband having children with another. This, however, may mean simply that the first husband was sterile. Perhaps some women have only a relative fecundity. Besides, years and changed conditions may have produced modifications in the general health or in the state of the internal genital organs favorable to fecundation.

It is probable that the metrites, salpingites, pelvi-peritonites play a part in many cases of this kind, and that the adhesions or old inflammatory lésions which opposed fecundation may have disappeared little by little under the influence of a favorable hygiene. I would not, however, deny the existence of relative sterility in two married persons—that is to say, their union remaining unproductive, one or the other may become fecund on taking another partner. The scientific precision necessary to prove the reality of cases of this kind is very difficult to obtain. Nevertheless, facts of this order having been noticed in the higher animals, we have a right to assume the possibility of them in the human species.

The influence of seasons on the aptitude for pro-

creation is quite generally admitted. Spring-time, which produces the phenomena of rut in most mammalia, exercises equally an action on man. It is in the months of April, May, and June that conceptions are most numerous. It is also at this period that most rapes and other crimes against chastity have been committed.

Just as the domestication of animals diminishes the periodicity of the rut, so social habits and the factitious environments which they create render less appreciable this action exercised by the return of spring-time on the genital functions of man. Hence conceptions and births are subjected in a much more marked degree in the country than in the city to the influence of the seasons. The month most favorable for conception appears to be May. It sometimes happens, through peculiarities in individual disposition which I do not pretend to understand, that in the same household several children of widely different ages are born in the same month.

It might be asked if all women are equally fertile at all periods of the year, or if some women are more likely to become impregnated in one month, others in another month, etc. I have recently observed the mother of a family who had four children, all born in January, and one miscarriage where, if pregnancy had gone to the full term, the child would have also been born in January.

It results from these facts, that in the case of

a woman who has had one child and is desirous of others it is well to make particular inquiry as to the epoch corresponding to her first conception, and to advise coitus at this epoch.

Perhaps primitive woman was fertile only at certain seasons of the year, and it was only by degrees that existing transformations were produced in her functions and physiological aptitudes. Of course, this is only a hypothesis, which I would advance with much reservation.

We know, moreover, the influence which changes of habit and mode of existence have on the genesic functions. Nobody is ignorant of the fact that certain domestic animals are much more fertile than the same species living in a savage state.

Some writers have maintained that women who are fat and of phlegmatic nature conceive much more readily in spring or in summer, while ardent, lean, and nervous women are much more apt for fecundation in winter. This opinion, reproduced in most monographs on sterility, does not seem to me to be sufficiently substantiated by well attested facts.

The influence of different races, and especially of their crossings, on the aptitude for procreation, is still to-day one of the most controverted questions. This influence seems to vary much, not only from one race to another, but for each individual case.

There is on record an instance where a mulatto woman had by a negro two mulatto children and

eleven true negroes, and another where a negress had from a mulatto husband nine black children and two mulattoes. There is still another case recorded where a negro had by a white wife seven mulatto daughters and four white boys. Begon saw at the Antilles a pair of twins born of a negress, one white with long hair, the other black with curly hair.

Cases of crossed heredity, from the mother to the son, or from the father to the daughter, are sufficiently common. Similar facts are observed in connection with half-breeds in animals.

What habitually dominates in heredity, as well in individuals of the same race as in the crossings, is not the sexual influence, but rather the different degrees of consolidation of type, or of such and such character in one of the procreators. That one of the two parents who belongs to the most ancient, the least mixed race, will have the predominance, whatever may be the sex. This is perhaps the reason that in crossings with other races the Chinese ordinarily take the precedence in hereditary transmissions of type.

This variety in hereditary transmissions and in the external characters of the products of one race or of different races, is also shown in their aptitude to perpetuate themselves.

Authorities admit the little fecundity of mulattoes among themselves, and the difficulty they have in perpetuating their families without frequent returns to one of the mother races.

At the same time, observations are so little conclusive that some anthropologists still maintain that crossings perfect the races, while others as stoutly affirm that crossings always tend to deterioration.

Often what has been taken for sterility resulting from crossing, is due to non-acclimation of one of the two parent races. We know, for instance, that Europeans do not become acclimated to the Sunda Islands, nor to Hindostan. Little productive among themselves in the first generation, they become almost constantly infertile in the second.

In Java, among the Lipplappens, or half-breeds between the Dutch and Malays, there is said to be a particuiar mode of sterility, which is extremely curious if true. In contracting marriages among themselves, the Lipplappens of the third generation procreate only girls, and these are always sterile.*

In most cases of this kind it is difficult to say how far the sterility is due to half-breeding and how far to want of acclimation.

Thus, in Egypt, the Mamelukes have never been able to perpetuate families with women of their own race—which proves how much climate may influence fecundity.

In what concerns the phenomena of hybridity in the human race, the views of anthropologists are far

* This fact is given by Broca. I have not been able, from conversations with natives of Java and with travelers, to obtain confirmation of the statement.

from being concordant. Broca's conclusions must still be accepted as the last word of science on this subject.

In man, as in other mammals, there are, according to races and species, widely different degrees of the reproductive faculty, or homogenesis. The half-breeds of certain races are perfectly productive; others are much less so; lastly, there are races whose procreative aptitude appears to be so obscure that the results of even a first crossing are doubtful.

The influence of marriages between near relatives (or *consanguineous* marriages) on procreation and the number and quality of the offspring, has been the subject of much discussion. It is incontestable that in all kinds of unions, either parent communicates his or her chances of morbid heredity. The child is in a certain sense the sum of the qualities and faults peculiar to each of its progenitors. But when the progenitors are of near kin, their reciprocal parentage is by itself a special cause of organic degradation, fatal to the propagation of the species. When the parents are characterized by any particular blemish, all authorities admit that they are very likely to transmit it to their posterity.

This question of marriages between relatives has been mixed up with a multitude of considerations, social and religious. At the beginning of societies, at a certain period of their development, unions between relatives, father and daughter, mother and son,

brother and sister, were sufficiently common, and the history of humanity offers multitudes of instances of procreation between near relatives.

We can only judge of the results of such unions by the quality of the progeny. We have to-day at our disposal, to decide the question, a certain number of examples which seem to me to be extremely pertinent. There are certain fishing stations on the coasts of France where the sea-faring population live in the neighborhood of a rural population without contracting marriages with them. In the commune of Batz, among others that I might mention, in the Loire-Inferiore, composed of 3,000 inhabitants, there has been frequent intermarrying, for a great many years, among near relatives of a dozen or so of families. With regard to most of them, the relationship is of the third to the fifth degree; and yet all, men and women alike, are robust, of good stature, firm health, and the children are numerous and healthy. I could cite many other observations of a similar nature, from which it would appear that consanguinity of itself is not especially detrimental to fecundity. As Sanson says, consanguinity raises heredity to its highest power, by causing to act in the same direction *atavisism*, or the disposition to revert to ancestral qualities and individual characteristics.

If, then, the parents are vigorous, well developed physically and mentally, these qualities accumulate in their descendants, and the influence of consan-

guinity is in such an event favorable to the species. If the progenitors are, on the contrary, sickly, or present any pathological state whatever, the hereditary vices of the two families are transmitted to posterity, and the action of consanguinity is then detrimental.

Not all pathological imperfections are equally transmissible to posterity. Thus, accidental deformities or mutilations are not inherited. Nervous diseases, especially those of the central nervous system, are the most transmissible hereditarily, even when they have been artificially caused.

The females of guinea-pigs rendered epileptic by certain lesions, give birth to young with epileptogenous zones, as Brown-Sequard has shown. In the human species, epilepsy, hysteria, and especially insanity under its different forms, are very often hereditary. This facility of transmission of diseases of the nervous centres to posterity has enabled us often to follow their gradation. Confirmed insanity is at times but the last stage of a long succession of psychical anomalies caused by vicious habits, a bad mental hygiene, the abuse of sexual pleasure, and especially of certain substances as alcohol, etc.

We are, then, responsible, to a certain point, for the psychical health of our posterity.

Happily for humanity, the offspring of the union of individuals who are markedly degenerated has not to arrive at the last term of degradation before being

smitten with sterility and consequently becoming incapable of producing the type of the degeneration.

We have spoken of the action of different *diatheses* from the point of view of sterility of both sexes. It is very probable that these diatheses become more and more pronounced if both parents are affected by them. But we touch here on a question as yet but little understood, and concerning which the data are insufficient to enable us to pronounce a scientific conclusion. The widely different states designated under the name of diatheses are themselves far from being clearly defined.

What may be affirmed with certainty, as a law of general physiology, is that everything that enfeebles the organism enfeebles its different functions, and may in the long run diminish fecundity or even produce absolute sterility.

It is to a series of diverse causes that we are to refer the depopulation of countries invaded by races superior in civilization. At the end of a variable time, the indigenous races tend to disappear completely.

Phthisis, intemperance, diseases and vices of every kind imported by us among savage peoples, contribute toward this result, *i. e.*, the disappearance of the autochthonous races.

Thus it is that in Polynesia, the women, once very fertile, are to-day relatively sterile. We have introduced into these islands diseases formerly un-

known, and in particular tuberculosis. And we know that many morbid states take away the aptitude for reproduction, long before their ultimate manifestations are realized.

Authors have advanced, to explain the disappearance of the procreative faculties in certain races, the view that in such and such countries (Australia for example) the sexual relations of a native woman with a European render her sterile, even with men of her own race.

This assertion, at least in so far as it is too absolute, has been contradicted by new observations. Some have explained cases of this kind by hypothetical modifications undergone by the constitution of the mother under the influence of gestation of an embryo begotten by such and such a father. Some writers maintain that the mother long preserves in her organization the impress of the constitution of the father, by a sort of inoculation comparable to that which causes her to contract diseases by the intermediation of the foetus. These views are far from being demonstrated, especially in man.

At the same time, several observations go to show that in certain animal species a female fecundated by a male acquires and preserves a disposition to produce, with another male, offspring markedly resembling the first.

I may recall to mind in this connection a series of facts well known. A mare, covered by a zebra,

gave birth to a half-breed zebra; afterwards, being covered by an Arabian horse, she had successively three zebra colts resembling the first male. A mare that has given birth to a mule, and is afterwards covered by a stud, has sometimes a colt presenting a marked resemblance to an ass.

This fact is classed by writers along with that of Australian or Polynesian women fecundated by Europeans, and becoming thereby relatively sterile with men of their own race, without, however, becoming infecund with whites.

Captivity suffices to render sterile a great number of animals. It has been supposed that moral causes act in the same way with savages.

Contrarily to this hypothesis, the case of the Hawaiian Islanders has been cited—people who are free, well fed, and yet whose numbers diminish in formidable proportions by the sterility of the women. The author of a memoir on the subject concludes that the physical organization of savages is refractory to civilized life.

Whatever may be the obscurity that still enshrouds facts of this kind, and the impossibility in which we are placed of explaining them completely in accordance with physiological data actually in our possession, I have thought it proper to state them, but with the restrictions which science imposes in reference to everything which is not perfectly demonstrated.

As to the greater or less fecundity of races pure or mixed, it is chiefly in acclimation that we find means to modify certain dispositions favorable to sterility.

The first principle of conduct for persons who desire to become accustomed to climates quite different from their own, is to adopt habits protective against the dangers which these new conditions of existence impose. Often the acclimation of the individual does not insure the acclimation of the offspring. There results a great diminution in the fecundity of the women, and a considerable mortality among the small number of children procreated by the immigrants.

The new-born of colonists, of pure breed, do not receive from their progenitors the benefits of acclimation. They must themselves stand the test, and if the climate be severe the trial is often fatal.

It does not suffice to sojourn in a country a certain number of years, or even several generations, in order to be adapted, naturalized, to a region.

In order to be completely acclimated (like the aborigines), especially from the point of view of reproduction, there is needed a considerable number of generations, and perhaps of crossings.

According to all the data pertaining to the subject, it is for the most part by intercrossing with indigenous races that immigrants obtain a more speedy acclimation and a more enduring fertility.

The most of the causes of sterility which I have studied thus far, result from an absence of impregnation. But in order that the reproduction of the individual may be accomplished, it is not enough that the ovule shall be fecundated; it must be grafted on the uterine mucosa, it must find there the materials necessary for its nutrition, and, lastly, the embryo, when it has arrived at the term of its development, must be expelled by the natural passages. Everything which hinders or opposes any of these phases, puts an obstacle in the way of procreation.

We ought, then, to take up in this place the consideration of abortion and extra-uterine pregnancy. Naturally the treatment of these topics should follow what has gone before; but as both of them belong to the general theme of Obstetrics and are fully treated in all the familiar text-books, we may be pardoned the omission of them from this treatise.

XII.

ARTIFICIAL FECUNDATION.

To finish what pertains to sterility and its treatment, we must briefly consider artificial fecundation as applied to man and the superior animals. This operation consists in introducing directly, by means of a little syringe, the spermatic liquid into the uterine cavity, in order to facilitate the congress of the spermatazoid and ovule.

It was first on fishes, toward the end of the last century, that experiments in artificial fecundation were successfully instituted. (See the reports of Jacobi, 1764 and 1766.) But Spallanzani was the first to demonstrate scientifically that the ova and the sperm, when brought together outside the parental receptacle, may give rise to the development of the embryo exactly as after sexual congress.

After having experimented on fishes, batrachians, and silk-worms, Spallanzani instituted experiments on the higher animals, and succeeded in impregnating a bitch with the seminal fluid of a young dog of the same species, which he injected by means of a small syringe into the womb of the animal.

Two years afterwards, Rossi of Pisa performed the same experiment with an equally favorable result.

It is evident from a physiological point of view that artificial fecundation is quite as likely to be suc-

cessful in the human female as in the brute animal, and I am certain that positive results of this kind have been obtained.

I shall not here reproduce the numerous discussions to which this question has given rise. Most gynæcologists are to-day agreed in considering artificial fecundation as a feasible operation under certain circumstances.

In fact, from a physiological and sociological point of view, the end of marriage is reproduction. If any abnormality opposes impregnation, there is nothing reprehensible in the interposition of the physician, to bring about this result by introducing, by means of an instrument, the seminal fluid in the cervical canal.

This question has been taken up anew and discussed during the last few years by the Society of Legal Medicine, and the conclusion reached was that artificial fecundation is in no sense immoral, and that the physician is justified in resorting to it in certain cases where fecundation under natural conditions has been found to be impossible. It is, in fact, the *ultima ratio* of the treatment of sterility in the woman.

I shall pass by the procedures described by the different writers who have occupied themselves with the subject, and set forth only that of which I have myself made use in fulfillment of the indication to perform artificial fecundation.

The first and indispensable precaution is to be

assured by microscopical examination that the spermatic liquid of the husband presents all the normal conditions, as far as can be determined *de visu*, for impregnation.

It is necessary, also, as far as concerns the woman, to note the state of mobility of the uterus, and the integrity of the tubes and uterine annexes; then to test the sensibility of the organ by several catherizations, practiced preferably with a flexible sound.

The next step is to procure some of the fecundating liquid of the husband; this may be taken from the vaginal canal after coitus.

It has been stated that, on account of the deleterious action of the vaginal mucus, it is not prudent to employ the sperm which has remained some time in the vagina. I think this fear exaggerated, for I have seen the spermatic elements display very lively movements after remaining several hours in the vagina. Nevertheless, for greater precaution, the woman may be advised to make a previous irrigation with an alkaline solution, or, with a fenestrated speculum in the vagina, to take a prolonged alkaline bath.

To perform the operation, the woman is placed in the lithotomy position, and the cervix exposed by means of a bivalve speculum. The syringe must be new and thoroughly aseptic. Then, supposing coitus to have taken place just previously, the semen is obtained directly by suction from the vaginal vault, or by scraping the vaginal walls. [Courty

recommends the use of a condom, to shield the semen from the vaginal secretions.] A few drops of the semen are sucked up, and the cannula is then passed immediately up to the fundus uteri. Then the operator presses the piston rod and slowly injects the fluid, carefully withdrawing the cannula; the whole operation taking five or six minutes. The woman should lie quietly in bed for several hours after the operation.

In certain subjects, as soon as the cannula is withdrawn, the sperm is suddenly expelled by the contractions of the uterus. To obviate this evil, we may withdraw the body of the syringe only, leaving the cannula in place for two or three hours, its proximate orifice being stopped by a little cotton.

Ordinarily no suffering is experienced, either during or after the injection. Sometimes, however, the patient complains of slight colicky pains; very seldom of severe, though transient pains, when the quantity of liquid injected has been rather large.

Some writers have seen salpingitis, pelviperitonitis, and phlegmons develop after these attempts at artificial impregnation. It is evident that these unfortunate cases resulted from the introduction of septic matters.

A little difficulty presents itself with regard to the antisepsis of the instruments. We can only employ heat as a means of sterilization. The antiseptic liquids used by surgeons, especially corrosive subli-

mate, have a deleterious action on the vitality of the spermatozoids.

Artificial impregnation is most often done immediately after a menstrual period. Sims has succeeded the sixth day after the cessation of menstruation.

If the first attempt is not successful, the operation may be repeated, varying the date from four or five days before the onset of the menses, to about the middle of the interval of the two periods. The successes which have been obtained after eight or ten fruitless trials are an encouragement to repeat this operation, which is generally harmless when done with the necessary precautions.

Among the conditions which call for or warrant the practice of artificial impregnation, we may enumerate, in the first place, hypospadias in the male — provided, of course, that the seminal liquid contains normal spermatozoids. Spasmodic contractions of the cervical canal or hypertrophic elongation of the cervix may also furnish the necessary indications.

The principal contra-indications to this mode of interference are: the presence of some well-marked chronic disease, such as tuberculosis, or syphilis; and, on the part of the husband, the absence of spermatozoids in the ejaculated liquid. In the normal state, at a temperature of 15° C., and with the necessary conditions of environment and humidity, the spermatozoa preserve their movements for 62 hours, while in

feeble and sickly subjects they become completely motionless at the end of several minutes. It is very evident that in these latter cases every attempt at artificial impregnation will be unsuccessful.

Among the causes which contra-indicate artificial fecundation are salpingitis and pelviperitonitis, whenever the traces of either of these affections can be detected. Then come the different forms of metritis, and principally mucous metritis. The various neoplasms of the uterus and its annexes—fibroid tumors, ovarian cysts, cancers—would be sufficient contra-indications against any attempts to produce pregnancy.

If a few authentic successes have been obtained with artificial impregnation, it is certain that the failures have been much more numerous.

Besides all the causes of uncertainty which I have enumerated, some gynæcologists attribute a part of the want of success to the circumstance that the instruments ordinarily employed have a narrow cannula, whence traumatisms and lesions may result to the spermatozoids. Impressed by this notion, Haussman advises, in place of the procedures hitherto employed, to introduce into the cavity of the uterus the cervical mucus charged with sperm, as it is naturally after a normal coitus. He has seen spermatozoa still very active in the cervical cavity long after sexual congress, and gives as the ordinary limit for interference the first twelve hours after connection. His instrument, or *spermatophore*, being larger and acting

on a larger quantity, is likely to injure a relatively smaller number of reproductive elements.

This method in reality does not differ from a simple catherization, except that it is practiced twelve hours after coitus. On the same principle, Eustache has advised to convey with the finger the sperm upon the cervical orifice itself, and he has published several successes obtained by this procedure.

Questions touching sterility do not present any great interest relatively to legal medicine. At a certain period in the life of nations, when fecundity was the principal quality appreciated in a woman, the inaptitude to procreate was considered as a disgrace. The chief of the family had the right to repudiate a sterile wife. We find numerous examples in history, and especially in the history of the Jews. "Give me children or I die," was the exclamation of the despairing Rachel, while Leah, blessed with fecundity though less beloved, said that God in rendering her fruitful had bestowed upon her the most enviable of gifts.

But to-day, in the present state of society, sterility, instead of being an opprobrium, is regarded as a boon by our fashionable women, who purchase it often at the expense of health and even of life.

Sterility of itself, unaccompanied by malformations which prevent the accomplishment of the sexual act, is not a legal justification for rupture of the marriage relation.

Sexual malformations, in the form of *hermaphrodisism*, may be divided into three classes:

In the first, or *lateral* hermaphrodism, are ranged the cases where in the same subject we observe on one side an ovary, on the other a testicle. In the second group, *vertical* or *double* hermaphrodism, we note on the same side both male and female organs. Lastly, in a third form, *transverse* hermaphrodism, the internal genital organs belong to one sex, while the external present the characters of the opposite sex.

These divisions are largely theoretical, and the few facts on which they are based are far from being conclusive. In fine, true hermaphrodism—*i. e.*, the coexistence in one individual of both the ovaries of the female and testicles of the male—while perhaps not impossible *a priori*, has never, so far as I know, been illustrated by a single well attested case.

The subjects designated under the name of hermaphrodites, far from possessing a double generative power, are ordinarily sterile. In the first place, in most of them the anomalies of the genital organs coincide with other vices of development incompatible with life. In those who arrive at the adult age, the sperm is almost always devoid of spermatozoids. When even these exist in glands normally constituted, the malformations of the internal and external genital passages completely oppose fecundation. In cases of this kind, where the medical jurist is called in, the complaint will be impotence rather than sterility.

